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The Railways of England.

IT is to be hoped that Mr. Acworth's popular book on this subject* will be largely read by the English public, partly because those who read it are certain to be interested in it as a matter of mere entertainment, partly because it is calculated to give the general public a little more idea than most of them have of the great achievements and the high merit of our English railway system, of the admirable manner in which the great lines are worked, and of the remarkable combination of forethought on the part of the working management with discipline and attention to duty on the part of thousands of subordinates, by which alone the traffic of our great lines could be carried on with the speed and regularity of working which mostly characterises it. To those who have paid any degree of intelligent attention to English railway working it ought to be impossible to contemplate the spectacle without something of enthusiasm, without a feeling that it is a thing for the country to be proud of. As the author observes, "When discipline, organisation, and mechanical appliances have done their utmost, the fact yet remains that each time we enter a train life and limb are at the mercy of every driver and pointsman along the line,—and in 1887 there was but one single train accident by which any passenger lost his life. And yet, though drivers and pointsmen are simply samples of the stuff of which the rest of the English working classes are composed, we prate of the decadence of English character and the degeneration of the fibre of English manhood." This is one of the examples of the healthful and bracing effect on human character of the systematic discipline of numbers in contributing to carry out one great end, and of the sense of serious responsibility thereby evoked. Perhaps also some readers who have not thought of it before may realise, in reading a book of this kind, something of the almost romantic interest which attaches to a great railway system, with its far-stretching territory, its squadrons of locomotives embodying the most perfect construction that mechanical design and skill can turn out, and its army of workers; instead of being content, as the average Englishman now is, to regard a railway carriage as a vehicle to get into and out of again with no more interest than if it were a street omnibus, and without a thought as to how it is all done.

The author tells us he went to Liverpool and Manchester two years ago to get materials for a magazine article, and the ultimate result is a volume of over 400 pages on the working of English railways. Such a book would hardly have been complete, of course, without an introductory chapter on the early days of railways, and what now seems the extraordinary scepticism of that day as to the future powers and performances of railway traffic. This chapter of the subject has been often written, and we need only remark that Mr. Acworth shows a creditable avoidance of the old stock stories, and gives some with which few readers, at all events, are familiar. We may observe that the *Athenæum* of 1843 is credited, on the other hand, with a remarkable degree of foresight (in one sense) in declaring that the expenditure for obtaining practically level roads showed want of faith in the capabilities of the locomotive engine, and that it "could climb the mountain-side as well as career along the plain." It was not till many years after the date of this utterance that locomotives superseded ropes on certain heavy inclines, and it was only very recently that Mr. Webb's compound engine achieved taking heavy trains up the Shap incline without an auxiliary engine. So far this prophetic belief in the power which could be exercised by the mere grip of a smooth wheel on a smooth rail (which, in spite of custom, still seems extraordinary) has been justified; but in favour of speedy travelling experience has proved that the level road was worth the expenditure. The effect which a slight gradient has upon speed and on the economical question of getting the best out of the engine is strikingly illustrated in the author's account of his experimental trip on the engine of a fast train from Paddington to Swindon, and back by an up train, in order to ascertain the facts as to the alleged increased difficulty in keeping time on the down journey. The story should be read in the book (pages 25-9), but the result was that to keep time to Swindon was an obvious struggle, and the other way it was an easy run in two minutes under the allowed time, the heaviest gradient being only 1 in 660 and great part of the way 1 in 1,320. It would seem, therefore, that the early expenditure on reducing gradients was well laid out for the future of fast travelling, though experience has shown that the powerful and heavy modern locomotive can climb gradients which were once thought to be impracticable.

The main portion of Mr. Acworth's book is occupied with an account of the special characteristics and working of the four great railways, London and North-Western, Midland, Great Northern and Great Western, the remainder of the important lines occupying a smaller space. It may be a question whether the Great Western has a claim to be bracketted with the other three, except in regard to its geographical importance as the great trunk line for the southern counties; its progress has been noteworthy of late years, both in working order and management and in the remarkable recuperation of its financial position, which has been greater than even the improvement in management would seem adequate to account for. But there still lingers about the Great Western, its road, its stations, and the stamp of its *personnel*, a half-antiquated air, which contrasts strongly with the completeness and the finish of everything on the other three lines of first magnitude, and with the alertness of their officials and employés. One reason we have seen suggested for this (not by the present author) is that the comparatively easy-going character and life of the south counties population offers little stimulus to the railway management, southerners being content with a railway service which would never satisfy the more energetic and busy manufacturing populations of the north. In regard to the long runs northwards, also, the three other companies are rivals and have all the spur of rivalry, while the Great Western has a monopoly in its long-distance routes. The Great Western runs very fast for a considerable portion of its course, but it has no more that pre-eminence for high speed which the wide gauge gave it in earlier days, seeing that under improved roadmaking and engine and carriage building the same speeds can be, and are now, safely attained on narrow-gauge roads. After we have passed Exeter going west the average of speed begins to drop, after we have passed Plymouth it becomes a comparative jog-trot. No one seems in a hurry in these south-western counties. But the fact

* The Railways of England (North-Western; Midland; Great Northern; Manchester, Sheffield and Lincoln; North Eastern; South Western; Great Western; Great Eastern; Brighton and South Coast; Chatham and Dover; South Eastern). By W. M. Acworth. With 56 Illustrations. London: John Murray. 1889.

probably is that the Great Western is still suffering from the effects of Brunel's ill-judged ambition for a giant gauge. There was much to be said for it at first. As observed, the running was splendid on it in comparison with the early narrow-gauge roads, and speeds were attained on it which could not then be attained elsewhere. But Brunel failed to foresee the future importance of uniformity of gauge for working into the systems of other companies, when the railway network of the kingdom became further extended. Moreover, the broad-gauge carriages, save for their (at that time) exceptionally smooth running, presented no advantage over the narrow gauge; the early models were painfully cramped in the longitudinal direction, the seats too close together, and even with the later and more sumptuous vehicles there is a cavernous effect in this deep interior which is repellent to passengers, as may be seen by the prospecting for "corner seats" which takes place as much as half-an-hour before the starting time of the Great Western expresses: the passenger feels deprived of light and air in the centre seats to an extent that is not felt in a narrow-gauge carriage. Then the weight of the rolling-stock knocked the road about very much,* and rendered maintenance and repairs heavy, an evil probably aggravated by the exceedingly injudicious method of laying the rails on continuous balks of timber, which of course tended to cant at the ends with the slightest subsidence of the ground, instead of on the cross-sleepers which give the weight so much wider a ground base. For all these reasons it is clear that the broad gauge must eventually go, and the company seem to be holding on to make the most of it so long as the existing broad-gauge rolling stock lasts, and until the moment shall come for converting the western portion of the line, which is still broad gauge only, into narrow. Mr. Acworth says in so many words that the reason Reading Station is allowed to remain in so wretched a plight is that it would cost 10,000*l.* more to build a new station for mixed gauge than for narrow only, and that the reconstruction is put off on that account. This seems to us to supply an intelligible reason for the generally worn-out and shabby appearance of many other things about the Great Western line. No other line of equal pretensions and prosperity would tolerate such a station as that at Bath for instance, to so important a town; and the long-lingering existence of the picturesque but not very safe wooden trestle viaducts in the western region is perhaps to be explained from the same cause. The line is lying under the shadow of a mistake made in the outset of its career,—one of its brilliant engineer's "experiments,"—interesting and ambitious, no doubt, but somewhat costly to posterity.

The author follows the popular idea in giving the place of honour in his book to the London and North-Western railway, and his and the popular idea is on the whole correct. Its prosperity is of the earliest date, its territory is immense, its revenue comes in, in the busy season, at the rate of 26*l.* a minute. In the matter of working it is difficult to say where there is much choice between the three, perhaps: the Midland excels it in the comfort of its saloon carriages; the Great Northern in certain brilliant feats of speed. But there is a steady-going and all-round excellence about the management of the London and North-Western which impresses one as being superior to any other railway management in a general way, though it may be difficult to name any precise point of superiority in detail. We learn for the first time from Mr. Acworth's pages that among its rivals it has a bad eminence for parsimony. "Everybody knows that North-Western engines are painted black, but everybody does not know that this is because black is the cheapest colour." This would be a virtue in the eyes of shareholders, however; and indeed, Mr. Webb, the superintendent of the Crewe Works, in answer to this accusation, said that as soon as his shareholders were getting ten per cent. for their money, he was quite ready to cover his engines with gold-leaf. But it is not hinted by the author that there is parsimony in regard to anything that concerns efficiency and safety in working. The London and North-Western attempts nothing sensational; it has the advantage of a splendidly-laid road with few gradients of any consequence; and it keeps up a programme of speed and punctuality adhered to as an everyday matter.

Mr. Acworth regards Crewe as the centre of the system, and has a good deal to say as to the work that goes on there. At Crewe Works everything required on the line is made. The North-Western alone, we are told, among English companies, rolls its own rails. Every large company now builds its own rolling-stock, but the North-Western makes for itself many things that other companies are content to purchase. Mr. Acworth found a man at Wolverton Works employed in etching designs upon the ground-glass plates that were to form the windows of lavatory compartments, and was told that the company had recently discovered that it could do this work for itself at half the price it had formerly paid. The rail-rolling is described and illustrated, and some notes are given as to the steel permanent way (one of Mr. Webb's patents), with steel sleepers and spring chairs which take the place of the usual oak wedge or key which keeps the rail tight in its place. About thirty miles of the London and North-Western Railway are now laid with these steel sleepers, and the author states (without taking sides with the steel) that he could not perceive the road to be any less elastic than the wooden sleeper road, even when he knew he was going over it. As to the spring chairs we are antagonistic. They may be very neat and compact in working, but we have no belief in the permanency of anything that depends on springs. An oak key will sometimes drop out, it is true, and the spring will not; but springs will work loose and leave the rail shaky, and an oak wedge seems a far more scientific method of getting firm grip of the rail without jarring, leaving just the amount of elasticity of the wood as a buffer between the outer jaw of the chair and the blow of the flange inside the rail. Touching on this point of keys, it is remarked that the Midland has followed the practice (though the author hints that they are changing their mind) of keying inside instead of outside the rail, on the ground that if a key inside drops out from shrinkage, the rail is held in place against any outward blow by the chair arm on the outer side, whereas if an outer key dropped, the rail might be bent out at that point,—all the heavy blows on the rail naturally being from inside outwards. We have not noticed the practice, but we should certainly distrust it on general constructive principles, as likely to make a more noisy and rigid road than with the keys outside, and unless two adjacent keys drop out (which chances are much against) there is not much danger of the shifting of the rail before the absence of the key is discovered. Of course the manner of laying the road makes an immense difference in the comfort in travelling, for reasons which are little thought of by the travelling public. Mr. Acworth recommends any one who is sceptical to close his eyes and listen as the "Flying Scotchman" goes through Doncaster on its way northward. "He will be very dull of hearing" if he does not recognise the point where the train passes from Great Northern to Great Eastern territory; the reason being that the latter railway finishes off the ballast level with the sleepers, leaving the chairs bare and the rails suspended; the Great Northern cover the sleepers entirely and pack the ballast almost flush with the head of the rail. "The difference in noise and vibration is simply enormous." We should doubt whether anything that has been suggested will make as good a road as the wooden sleeper in well-laid ballast, but the steel sleepers may prove an economy in the long run, no doubt. The question whether they should come into general use is of no little commercial importance, seeing that steel sleepers for the Great Britain railway system alone would amount, according to the author's figures, to 4,000,000 tons of steel.

Something is of course to be said as to the compound engines of recent invention. Mr. Acworth admits, as others have done, that it is exceedingly difficult to get at the real data for estimating the economy claimed for this system. Mr. Webb's compound, with the central low-pressure cylinder, claims to effect a saving of 6 lbs. a mile in coal. It may be doubted however whether this economy is not balanced by greater cost in building, greater friction and greater expenditure of oil &c. The fact remains, however, that Mr. Webb's compound engine for the first time took a train up the Shap incline without an auxiliary engine, which looks like a direct economy so far. Mr. Worsdell's compound engine, with two cylinders only, high and low pressure, and therefore simpler in make and action, seems more like achieving economy; the North-Eastern Company have been having twenty engines built of exactly similar make except that one half are compound, as a test, and we are told the latest news is that the compounds can give the others 5 lbs. a mile of coal and beat them. We should prefer to hear of reliable statistics in favour of the Webb compound, because it is such a grand-looking machine; the two cylinders of the Worsdell, one large and the other small, look lob-sided and awkward.

One of the interesting points in railway working described is the marshalling of waggons for goods trains at Edge-hill. The object is that those to be dropped at the earlier stations should be in front of the train, those later at the back. The waggons which are for the same place, which may be standing in any promiscuous order, are all chalked with the same number, and allowed to run by gravitation down an incline into the corner of a system of rails laid somewhat like the bars of a gridiron, and a pointsman at the corner reads their number and turns all with the same number on to the same line in the gridiron. They are thus grouped according to destination, being checked at the proper place either by men ready to put the breaks on, or by a cleverly-contrived automatic grappling-hook between the rails. These groups are then run out, (again by gravitation) one after the other at the opposite corner of the gridiron, till they are all ranged on a single line again, but with the groups one behind the other in the required order. But for this prior arrangement, of course, immense time would be consumed in picking them out and shunting backwards and forwards at the various stations. As it is, the engine has only to take the first group off into a siding, at the first station, and go on with the rest.

One portion of the L. & N. W. R. which may be said to be not equal to the fame and importance of the line is its terminal station at Euston, which, in spite of the dignity of its cold-looking central hall, is very deficient in general dignity and finish and platform space, and perhaps it is only the great difficulty of carrying on such an undertaking without deranging the traffic that has led to its rebuilding being deferred; though whenever that may be done, we rather hope that the venerable Doric portico, an interesting witness of the taste of a former day, may be spared. The Midland certainly cuts out the North-Western in dignity of terminal accommodation, a luxury which has cost the company no less than 9,000,000*l.* Part of this went in the goods depôt. "It stands upon the site of 600 houses, and the upper floor,—for the depôt is in two tiers,—consists of 16,000 tons of iron plates" &c., and it contains within its area no less than seven miles of railway. The clearing of the site was a work of years, and in some cases eight or ten different rights had

* It was probably on this account that the old model of Great Western engines were made without flanges, to the driving-wheels, which merely run on the upper surface of the rail, the leading and trailing wheel flanges being depended on to keep the engine in its place. It would be interesting to know on what statistics this plan has been recently abandoned.

to be bought up before possession could be taken of a single house. The wrought-iron screens separating the yard from Euston-road, which the author alludes to, are not work to be enthusiastic about, but they were well intended and are at least "handsome"; as may be said (in spite of Scott's name) of the great hotel, the style of which is rather out of date to the architectural taste of the present generation. One of the first points we notice in the chapter on the Midland is in regard to the Lickey incline, "the steepest piece of railway on a main line in Great Britain." The gradient is 1 in 37, and the proposal to run locomotives up it was considered exceedingly bold at the time. An English locomotive built for the task could not take its own weight up the hill, and the first engines for the purpose were procured from America. The remarks of the author on the problem of the Lickey incline under present circumstances have a bearing on the question above adverted to as to the economy of making level lines, and are of sufficient interest to quote:—

"Whether the directors of the Midland have as good reason nowadays to be satisfied of the wisdom of ever climbing the Lickey hills at all, is a different question. Modern engines have not increased in power faster than modern trains have increased in weight, and the Lickey incline implies to-day the constant maintenance of five 'banking' engines* to work it. Five engines at the most moderate estimate means 5,000*l.* a year, a sum which, if capitalised, would buy up a good deal of property in the very heart of the town of Bromsgrove; for the line, it should be said, was constructed in its present position in order to economise in the matter of land. Nor is expense the only thing. For the two miles between Blackwell and Bromsgrove seven minutes is allowed even by the fastest express. Every train going west, for all its continuous brakes, must stop at Blackwell to pick up a brakesman, and then stop a second time at Bromsgrove to set him down again. On the return journey it must stop at Bromsgrove for the banking engine to join on behind, and then pant slowly and laboriously up the hill. As for goods traffic, if any one wants to see brake-blocks on fire, let him ride down the Lickey incline on the tail van of a heavily-laden coal train, with the side-brake of every second truck pegged down as tight as the brakesman can fasten it."

What Crewe is to the North-Western, Derby is to the Midland, and the author does justice to this great workshop, and to the speed, punctuality, and excellent working of the line. Mr. Acworth mentions one run of 99¼ miles, Leicester to London, leaving the former at 5.56, and being timed to run the distance in two minutes *over* the two hours. When he got out at St. Pancras the clock gave 7.53, which he could hardly believe till confirmed by his own and the guard's watch. Considering the gradients are many and heavy, this was a feat. In the description of the shop-work at Derby, a tolerably detailed account is given of the "Forging of Crank-axles," which the author suggests might be a subject for poetry, as much as the "Lay of the Bell." The forging comes to Derby, from Sheffield, in the rough. The first thing done when it comes to Derby is to cut out of each of the "throws" a slice wide enough to allow the "big-end" (of the connecting-rod) to pass through. One slice goes to the laboratory for chemical testing, the other to the mechanical testing-room. If the tests are not satisfactory, the axle is returned. Such are the precautions which modern fast travelling requires, even when we are dealing with steel. It would be amusing, were not the subject so tragical, to read the indignation expressed by writers in newspapers when a serious accident is caused by an axle breaking; fortunately a rare occurrence now, but one which no human foresight can absolutely guard against; yet persons who are ignorant of the manifold precautions taken to have safe metal in the axles regard the company as having a moral complicity in the accident.

The author does not think, nor do we, that the Midland made a good or useful move for the public in abolishing the second-class carriage; but the public owe them an immense debt for starting the practice of "third class on all trains," which has received the compliment of imitation by two other of the great companies, its financial results having been unquestionably favourable to the Company.

The Great Northern Railway, a former Chairman told an enquiring shareholder, "ends in a ploughed field four miles north of Doncaster"; *i.e.* at a junction with another company's line, at that time at all events. Mr. Acworth says that in the case of the London and North-Western Railway the question "what foreign company's carriages, if any, run into Crewe Station?" could only be put to a candidate for honours in Bradshaw; whereas the Great Northern, on the other hand, is a give-and-take line, which is always running parts of its course over the ground of other companies. But the style of its trains is its own, and it has fought its way up to be the representative line of high speeds; "fifty miles an hour comes as natural to the Great Northern as twenty-six miles an hour to the great Continental companies," says Mr. Acworth. His enquiry into the real times of the "race to Scotland," and the truth of the other "records" that were set up against them, we must only refer the reader to. The great point in running fast trains being not to make short bursts, but to keep the pace going regularly, leads the author to a dissertation which ought to be of interest to the general reader, as to the problem of keeping up high speeds from the engine-driver's point of view, and the amount of management that is implied in doing it with the necessary regard to economy. A perusal of these pages will serve to make the reader understand, as Mr. Acworth says, that an engine-driver's business is something more than pulling a handle to turn on steam, and a stoker's something more than shovelling coal on. In regard to high speeds, and the state of the line to be kept for them, the author mentions seeing a district engineer of a great line, walking on the railway, stop to pull up a small weed. "I always teach the men," he said, "to keep the road like a garden path; it may not matter to the running of the trains, but it keeps them up to the mark." That is what modern railway travelling means in this country: everything kept up to the mark.

The comparison between English and French trains is significant. The best French expresses only come up to our second-rate ones. The *train de luxe* from Paris to Marseilles, first class only, travels at a rate of 37·28 miles an hour over all (including stoppages), at twice the charge of the fastest London to Penzance train, and only a mile an hour faster. With such trains as the Great Northern, North-Western, and Midland expresses there is no comparison at all in France. This reminds us to mention Mr. Acworth's story of some French engineers being taken over one of our large lines, and the driver being asked "if he would not like to show these French gentlemen how to go a little?" Replying that he would like very much, he was told to "go ahead," and nine successive quarters of a mile were timed at 80 miles an hour. The impression on the visitors, we are told, was all that could be desired, but their English friends agreed that it was better not to give drivers *carte blanche* as to speed. With present means something like 80 miles an hour appears, however, to be the limit imposed by the conditions under which engines run.

We quite agree with the author in his criticism as to one of the few points in regard to railway working which may be considered in an unsatisfactory and antiquated state, that of fog-signalling. The idea of the signalling under such circumstances being carried on by a man sitting in the fog under the signal post and putting two detonators on the line when he sees the signal arm put at danger (which with a high signal post he might have great difficulty in seeing in a thick fog) and taking them off when the signal arm is dropped, is not in keeping with the elaborate arrangements now made for every other kind of signalling on railways. There must certainly be an automatically acting fog-signal before long: indeed we expect the time is not far distant when every train will automatically record by signal its own entry on each "block" of a line of railway.

The interest of the subject has carried our remarks to some length, though we have only touched on a few of the interesting points in Mr. Acworth's book, which we cordially commend to the attention of our readers.

* In railway phraseology, a "bank" is an incline; a bank engine, or banking engine, is an auxiliary engine to assist in drawing the train up the "bank."

SOME SPECIAL WHITE PAINTS.

BY H. C. STANDAGE.

WHITE lead and "honest linseed" are the foundation materials,—or were twenty years ago,—of the painter's trade. To-day, however, while still holding its own, white lead has to compete with many rivals, and not without cause, because it is a paint that is injurious to the maker, injurious to the user, and offensive to the smell of everyone for some time after freshly laid on. But painters find it so good in body, or covering power, and so easy to work with, and so heavy bulk for bulk, that the universal use of it dies hard. Every one has heard of painters' colic, even if they are not personally acquainted with the disease itself. The painter who is frequently using lead paints imbibes solid particles of paint through the pores of the skin, and in time becomes surfeited with an excess of metallic lead in his constitution, so much so that his blood is poisoned, and, unless the poison is arrested in its action in time, he dies of lead-poisoning. Just as surely will these fatal effects follow the constant dabbling with lead paints as if the painter swallowed a dose of the deadly sugar of lead (which chemically is acetate of lead—lead corroded with vinegar). In the latter case of poisoning the effects are rapid, whereas in the former they are slow, but, nevertheless, sure. It may not seem possible to many persons that the solid mass of white lead should be capable of entering the body through the skin, and not through the mouth, but it does so, and in the following manner:—Lead pigments, mixed with linseed oil, unite therewith and form a chemical compound—linoleate of lead, and this compound is dissolvable in water. It is a lead soap. We have an analogous action in the union of the alkali in soap with the grease and dirt on one's hands when washed. The soap unites with the grease, and forms a froth or scum, which is then readily removed by water. A similar scum is formed when the painter washes his hands, after using the paint-brush, but, as he may have been using the brush for hours before washing his hands, the paint that has smeared his hands has been so long in contact with the pores of the skin so as to have become practically absorbed therein.

Thus a process of slow poisoning goes on day after day, month after month, year after year, until at last the painter's wrist drops—the poisonous blood has so weakened the nerves of the wrist that the painter has no longer sufficient nerve-force to control the necessary muscles for holding the brush—he has got lead palsy; the blood-vessels of his hand have become filled with lead paint sucked in in a similar manner to water by a sponge. In the making of white lead, also, the workman who attends to the making of the stocks runs the risk of poisoning because the fine particles floating in the air enter his nostrils and mouth, and settle in the skin, and so become carried into the system; attempts have been made to obviate this fatality by allowing the corroded lead to fall through a wooden grating into water; but even then personal contact with the pigment cannot be avoided at all times. The colour-grinder also suffers under the same evils, and thus white lead, from its chemical birth to its final resting-place, is a source of dangerous disease.

Painters, therefore, owe a debt of gratitude to those makers who have produced white pigments that fitly replace white lead in all its qualities without its injurious drawbacks. The prime factor in the white paint that should compete successfully as a paint against

white lead is opacity, or covering power. This important quality we have in *Griffith's patent white*. This pigment is made from zinc, a metal that gives several white salts, but all of them are destitute in body or opacity—that is, the particles are exceedingly fine, and they do not form an unctuous mixture with linseed oil, so that when ground up as paint it fails to hide the colour of the surface on which it is laid unless several coats of the white be applied. The chief whites of zinc are the oxide or carbonate, but as they suffer this disadvantage of want of covering power it would be useless to put them on the market as rivals to white lead, therefore Messrs. Griffith Brothers turned their attention to perfecting the sulphide of zinc. This salt of zinc is usually of a greyish hue, but under Messrs. Griffiths' treatment it is so far perfected as to be little inferior to white lead in whiteness; a slight deficiency in whiteness is an advantage rather than otherwise, because when mixed with staining colours the tone is not so harsh or crude as that produced with perfectly white lead. While thus little inferior to white lead in brilliancy, it far exceeds it in opacity, or covering power, being 30 per cent. denser, weight for weight. Consequently zinc white is economical in many ways; the cost of carriage of 1 cwt. of zinc white is less than that for 1¼ cwt. of white lead; the cost of labour is less for laying on 1 cwt. of paint than for 1½ cwt.; the amount of oil required is less than that required with white lead, and the result is not inferior to the best painted white lead surface. Looked at from a sanitary point of view, Griffith's zinc white is satisfactory; sulphide of zinc does not unite with linseed or other oil to form a compound soluble in water, and, therefore, a smear of paint on the hands is not so readily, if at all, imbibed into the blood; and even if it were, it has not the fatal effects of the deadly lead paint. From a decorative point of view, this white paint is also superior to white lead. Ordinary white lead is a carbonate of that metal (sometimes a mixture of carbonate and hydrate of lead), and the chemical union between the components is so feeble that many other chemical bodies will separate them, whence the composition of the white lead is destroyed; thus sulphur in any form, whether it be present as a component of another pigment, whether it be present in the air as an invisible gas, or whether it be in a free state commingled with the particles of some cheap or adulterated paint—this element sulphur will seize on the metallic lead in the white carbonate and form a black compound sulphide of lead. Now, the air of towns is never free from sulphurous fumes, and, as a result, wherever white lead is used as a paint, it will every hour of its exposure be gradually changing in its chemical composition until at last the chemical reaction that has been going on is manifest in the darkened tone of the white paint. The brilliant white tone is now a dirty grey or drab. Whether the white lead be used as a paint alone, or as a foundation for mixing staining colours with, the same reaction silently goes on, with the inevitable result of a change of hue. With Griffith's zinc white, however, no such change occurs, not only because the pigment is already a sulphide of a metal, but because the union of the sulphur of zinc is so intimate that not even a fierce red-hot heat will separate the two. Zinc white is practically not decomposed by heat, and this inseparability of the components of zinc sulphide is not lessened by mixture with other pigments, because the affinity between the zinc and sulphur is very much greater than that of either the zinc or sulphur for any other body brought in contact with this compound: whereas quite the opposite is the case with white lead, because even a weak acid will decompose it, separating one of its components,—the carbonic acid,—and so destroying its quality as a paint. Another advantage of zinc white is that it has no smell, whereas the smell of white lead is very strong, and familiar to every one who enters an apartment that has been painted even so long as three weeks previous. Until the introduction of Griffith's zinc white, white oxide of zinc was the chief substitute for white lead; but its poorness of body soon caused the demand for it to diminish, until now it is very rarely used, except as a final coat over white lead to protect the latter from the fouling action of gases. Nearly twenty years' use of "zinc white" has gained for it wide recognition amongst builders, decorators, and contractors for all large painting jobs.

Another rival to white lead, and one that was invented to supersede the latter, is Freeman's *Non-poisonous white lead*. On reading the above title the reader will mentally ask, "Why all the previous deprecatory observations on white lead if there is a 'non-poisonous' variety fit for a paint?" But here a few words of explanation are necessary. Freeman's non-poisonous white lead is in great part a sulphate of lead, a salt of lead that is without smell and without body as a paint, therefore it was neglected as a paint until Messrs. Freeman perfected it and brought it into a fit condition to use as a paint. But, howsoever produced, it could not chemically be made to possess sufficient covering power or opacity alone. On the addition, however, of oxide of zinc,—a white substance that is also destitute of much body and opacity,—the opacity of the lead sulphate was astonishingly increased, so much so that it is not inferior to white lead in that respect. This white lead substitute is "perfectly innocuous, will always retain its colour, is superior in body, colour density, and durability to white lead manufactured by the ordinary methods: it mixes more readily with oil, and is entirely free from the injurious smell of poisonous white lead." Basing their claims for support on these qualities in their product, the makers can confidently assume that they are putting into decorators' and painters' hands a formidable rival to the injurious white carbonate of lead. Independent testimony, however, also speaks highly in favour of Messrs. Freeman's preparation, for it has been proved that the lead sulphate, which forms the basis of the non-poisonous white lead, is practically insoluble, and it is not dissolved by any fluids of the human body; and, moreover, there are no fumes given off from it when used as a paint, like those given off from carbonate of lead. It is also insoluble in water or acids, and, as a consequence of its inertness towards other bodies, Freeman's white lead may be safely mixed with the most delicate stainers without fear of the resulting hue changing at any subsequent time. If brought into the presence of sulphurous fumes there is no darkening of the colour, because if any chemical union takes place between the sulphur and the white lead, the paint would still remain white, because white *sulphate*, and not black *sulphide*, of lead would be formed. As, however, the lead component in the sulphate possesses already its full complement of sulphur as a fellow component, and, moreover, as the pigment is not disintegrated by the oil (as in the case of carbonate of lead, whereby carbonic acid gas escapes), there is no metallic lead set free for any adventitious sulphur fumes to seize on; consequently, the stability of colour of this lead white is chemically perfect. As regards sewer-gas, non-poisonous white lead is practically unaffected, whereas ordinary white (carbonate) of lead is soon changed into a black or brown hue. As regards its permanency for outdoor work, it resists the action of the weather better than white lead, because it is not affected by acid vapours nor foul air, and when mixed with oil and dryers it exhibits no tendency to separate from those vehicles when in use, and, as a matter of fact, it requires less oil and dryers in mixing than does ordinary white lead, and since it does not form the chemical compound,—linoleate of lead,—it has no tendency to become translucent, or, in other words, lose its opacity or body, consequently it will restrain the colour of the underneath surface from appearing through it in time, a process which ordinary white lead does admit of. As regards its artistic qualities in combination with other paints, there is no white to equal it for delicacy of tints; *e.g.*, ordinary white lead in mixture with blues gives very crude tones,—*e.g.*, Prussian blue and flake white, and so likewise with many other colours; zinc oxide gives chalky hues, whereas "non-poisonous white lead" produces the most delicate hues conceivable. This is a very important matter where the decoration of an interior is in process.

The remaining white pigment fit for a paint is *Oxide of zinc*; this pigment possesses many qualities that fit it for use as a paint, it is the whitest of all white pigments, it is perfectly innoxious, and harmless in mixture with other paints and in the presence of foul gases, &c., and for this reason it is frequently used as a final coat over ordinary white lead to preserve that pigment from changing colour. Zinc oxide, however, has serious disadvantages that disqualify it in great measure for general use; it is greatly deficient in body or opacity and is a bad dryer in oil, especially so on a non-porous surface.

The following comparative tests of the foregoing four white paints were made by the writer—amongst many other tests—to ascertain the relative covering power and drying qualities of each. A piece of black polished ebonite was used, so that the oil should not be absorbed, and also, being black, that it should appear through the coat of white paint wherever that was laid on thinly. 1 dram of Freeman's non-poisonous white lead required 1 fluid dram of linseed oil to thin it to the consistency required for working as a paint (this sample of white was already stiffly ground in oil, being taken from a sample tin). The above amount of paint covered exactly 6 × 6 inches, and was laid on as evenly as possible, but even then it did not perfectly hide the black of the ebonite showing through.

Griffith's zinc white was next taken; ½ dram of dry powder required ½ fluid dram of oil, and the mixture covered 6½ × 7½ inches and was very opaque,—in fact, no black whatever could be seen through it.

The third test was with zinc oxide. One scruple of dry powder (as there was not enough surface of the ebonite left for covering with a larger quantity) required 1 fluid drachm of oil, and covered 3 in. by 10 in., and even then was only semi-opaque in parts—that is, it had less body, or covering power, than Griffith's white, as it did not entirely prevent the black of the ebonite appearing.

Lastly, one scruple of dry powder of pure white carbonate of lead required thirty-five fluid grains of oil, and the mixture covered 2½ in. by 7½ in., and exhibited good opacity, like Griffith's white, as it perfectly prevented the black surface of the ebonite being seen.

The above tests were made on Dec. 19, 1888, and the piece of ebonite on which the coats of paint were laid was put out of touch of everything in the writer's laboratory (so that it should have the full effects of all the noxious gases incidental to such a place). A month after the tests were made the paint had not dried. In six weeks, however, each coat, excepting that made with the zinc oxide, was dry; exactly two months after they were all dry, Freeman's white and the white carbonate of lead being hard, Griffith's white being slightly tacky, and so likewise with the zinc oxide; this tackyness, however, was not due to the pigment but to the oil, as that had not entered into combination with the pigment, and as no dryers were added the oil had to dry simply by imbibition of oxygen, a process that extends for at least three months with good linseed oil. As regards the colouration, Freeman's white lead was a dirty white, Griffith's white was a cream-colour, zinc oxide was a milk white, and white lead a light buff. But on close observation, these effects were not due to the pigments but simply to the oil, for on scraping each coat of paint, each showed up white in its natural tone; Freeman's white dried with an enamel-like surface, so did the zinc oxide. Each coat, while the oil was still wet, was touched with a drop of sulphuric, a drop of hydrochloric, and a drop of nitric acid, to test the efficacy of each paint to resist acid moisture. Although the sheet of ebonite was

kept horizontal all the time of drying, these drops of acid spread over the surface in every case excepting with Griffith's white, the spreading being greatest with Freeman's and with zinc oxide, in both cases the white paint being eaten away or dissolved.

From the above comparative tests it will be seen that one-half the weight of Griffith's zinc white covers a greater surface than Freeman's white lead, takes the same amount of oil, and exhibits a greater opacity or covering power; whereas Freeman's white lead dries with more of an enamel and harder surface; that zinc oxide is the whitest in tone of all the four paints, and that white lead is not superior to any of the other whites, but in many respects positively inferior.

The relative covering powers of each paint were as follows, the calculation being worked out from equal weights of each:—

Freeman's white lead	36	sq. in.
Griffith's zinc white.....	98	„
Oxide of zinc	90	„
Ordinary white lead.....	57	„

It should be remembered that the sample of Freeman's paint was already ground in oil, so, weight for weight of dry pigment, the above number of square inches would be greater from 1 dram of dry powder of non-poisonous white lead.

The density is in the following order:—Griffith's white (greatest), ordinary white lead, Freeman's white lead, oxide of zinc; the drying qualities of Freeman's white being the greatest.

NOTES.

THE large and complete plan of the results of the Acropolis excavations in course of preparation by Dr. Kaweran will not be ready for many months. Meanwhile, the General Ephor of Antiquities promises that a provisional plan, embodying the chief topographical discoveries, shall be published in an early number of the Δελτίον. It will be eagerly looked for, especially as regards the remarkable discoveries to the south and south-west of the Parthenon. Pending the appearance of this plan, it may be noted that the remains of walls found here have thrown unexpected light on the condition of the south side of the Acropolis during the period between the Persian war and the administration of Pericles. About half-way between the foundations of the earlier Parthenon and the south wall the remains of another wall have been discovered, running nearly parallel between the two. This was the retaining wall of the first terrace erected to support the earlier foundations. The space between it and the foundations is filled in with "Persian" *débris*. This wall was clearly only intended to be provisional, but has never been removed. At the time of its erection the south side of the Acropolis must have presented the appearance of a double terrace. This wall and the foundations appear to belong to the same period. Considerably later it was decided to build the present south wall, and to level up the space between it and the temporary wall to the height of the first terrace. The "Persian" *débris* was exhausted, so the space was filled simply with earth and with such fragments of marble, &c., as were lying about, owing to the architectural works going on. The wall, if begun by Cimon, was not finished till the time of Pericles. These particulars are taken from Dr. Dörpfeld's report (dated February, 1889), which has just appeared in the *Mittheilungen*. The work at this particular spot was then completed.

THE decision of Mr. Justice Kekewich, in the dispute The Crown *v.* The Proprietors of Queen Anne's Mansions, in regard to the obstruction of light to the Guards' Chapel, though of more general interest than most "light and air" cases from the subject-matter of the action, contained no new principles. We had again the evidence about the angle of 45 deg. from specialists, and again the same judicial denunciation of any such hard-and-fast rule. There was some attempt made in the course of the case to prove that there was, though an obstruction, yet sufficient light for a chapel. This argument is also a very old friend which has, over and over again, been proved to be useless, as the owner of the easement has the right to the same amount of enjoyment of the premises as he has been accustomed to for the statutory period. The surprising thing about "light" cases is that the parties cannot come to terms without going to law, for a substantial obstruction of the light must always be evident, and a reasonable compromise should usually be possible. It is also surprising that the owners of servient tenements are not more careful in making sure that the new buildings will not infringe existing rights before the structure is erected.

A LONG letter has appeared in the *Times* from Mr. W. N. White, who has entered the lists against the hon. secretary of the Railway Companies' Association (Mr. Oakley) upon the new classifications of railway rates. Mr. White dates his letter from Covent Garden Market, and, of course, looks at the matter from his own special point of view; but his experience is interesting to traders generally, and gives force to his suggestions. For instance, we are informed that, when engaged in a law-suit with a certain railway company to whom he was paying no less than 500*l.* per week for carriage, he was compelled to send a blank cheque every day for months, as they would deliver nothing until the freight was paid, and he could not otherwise obtain possession of his goods. A still more noticeable statement is made with reference to recent advances in rates, which have, Mr. White says, been considerably modified through the intervention of the Board of Trade under the provisions of the new Act. This is satisfactory, as it goes to show that last year's legislation is proving of value in one direction at least. The Department have, however, an extremely difficult task before them in the settlement of the new maximum charges, and have doubtless been overwhelmed with complaints and conflicting proposals. Arrangements will probably be made, by the way, by which objections relating to Scotch and Irish lines will be dealt with at Edinburgh and Dublin respectively. The letter under consideration travels very much over old ground, but we notice a good suggestion with regard to the classification, which can hardly be objected to by either party to the controversy, and which would in a very simple way dispose of this part of the question. The nature of the classification issued by the Railway Clearing House is now well known, and Mr. White's proposal is that their classification of January, 1888,—that is, the last edition, containing the result of all previous experience up to that date,—should be the one accepted by the Board of Trade in lieu of those just submitted. Most of the complaints with regard to the latter,—as apart from the schedules of mileage rates and terminals,—arise from the fact that they differ from the Railway Clearing House Classification of 1888. This was satisfactory to the Railway Companies, of course, and was generally acquiesced in by their customers, although not entirely free from anomalies. The rates applicable to the different classes would still require to be arranged, and it is almost hopeless to expect that a basis satisfactory to all will be arrived at; but much would be accomplished by the adoption of this plan with regard to the classification, should it meet with that general approval which it appears to deserve.

IT is to be hoped that the public stir which is being made about the National Portrait Gallery, or rather about the non-existence of one, will have some effect on the Government, as men whose word is of weight, such as Sir Henry Layard and Sir John Millais, have put in their protest in so decisive a manner. We have long been promised a building for the national collection of portraits, but such promises an English Government considers not worth remembering. Imagine such a thing in Paris as a national collection of portraits being left for years in a shed, or sent off to a popular museum in Belleville.

A GREAT number of Exhibition "Congresses" are announced to be held in connexion with the Paris Exhibition, of which a list with the dates has been furnished by the Paris correspondent of the *Times*, which we presume may be taken as correct. From this list it may be convenient to put on record the following dates of such of these Congresses as deal with subjects that are of special interest to our readers:—

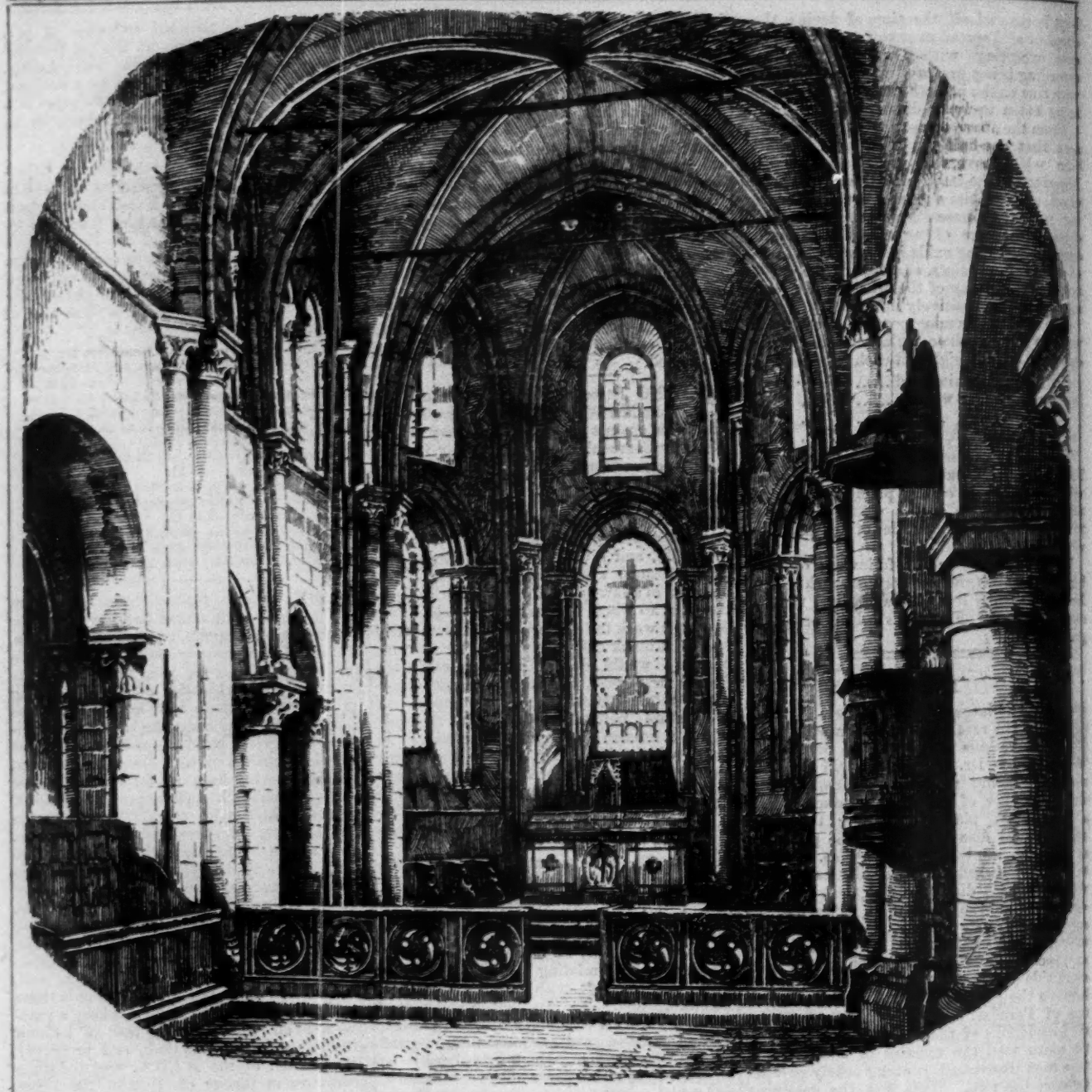
Congress of Architects—June 17 to 22.
Protection of Works of Art and Monuments—June 24 to 29.
Cheap Dwellings—June 26 to 28.
Technical Education—July 8 to 12.
Workmen's Clubs—July 11 to 13.
Workmen's Share in Profits—July 16 to 26.
Artistic Copyright—July 25 to 31.
Hygiene—Aug. 4 to 11.
Electricity—Aug. 24 to 31.
Mines and Metallurgy—Sept. 2 to 11.
Building—Sept. 9 to 14.
Labour Accidents—Sept. 9 to 14.
Applied Mechanics—Sept. 16 to 21.
River Utilisation—Sept. 22 to 27.

SOME of our readers have, no doubt, noticed with mixed feelings that the nature and properties, present and possible, of the District Surveyors of the Metropolis are being debated in the London County Council. Poetical justice seems to be doing its duty when those who have troubled us come in for a turn under the harrow. Architects, surveyors, builders, and the world at large have grown up with District Surveyors, the income-tax, keen frosts, and north-east winds; but no one has ever professed himself quite delighted with them. The inevitable may be accepted cheerfully, and that is as much as can be expected; there may be some slight solace in the thought that things are not so awkward as they might be, and as they are elsewhere. Might not things be worse, for instance, if District Surveyors were *not* practising architects, brought up with the rest of us, and accustomed to the difficulties of metropolitan practice? Might not, also, the interests of the public suffer, if only those unable or unwilling to make and keep a practice were entrusted with the task of looking after the safety of life, limb, and property? The Council of the R.I.B.A. reported some years ago in favour of District Surveyors "not being mere servants," considering that they would then be wanting "in that *personal* authority which has been found of great benefit in obtaining compliance with requirements and the correction of irregularities." We have not noticed as yet any longing for a body of inspectors, acting under the direction of a committee, and debarred from private practice unless *sub rosâ*.

THE *Co-operative News* for April 20 has been sent to us, and our attention has been directed to "the Children's Page" of that publication. This page, we notice, is edited by a lady, and we thank her for a well-meant attempt to put in a word for Architecture as a profession, which she does by reprinting from an American periodical (*Harper's "Young People"*) a somewhat "high-falutin" article by "John S. White, LL.D.," entitled "The Six 'Wide-open' Professions." We do not know whether Dr. White is an authority on the condition of the architectural profession in America, but he writes:—

"Nearly all the professions and most lines of business are so overcrowded to-day that the young man who has reached that point where he must choose his life-work stands dazed and halting, unless somebody's empty shoes are ready for his feet. Possibly I may help with a few bits of advice, for there appear to me to be half-a-dozen professions which are calling in ringing tones for men to enter. These are architecture, railroading,* elec-

* We are not well-enough versed in American terminology to know whether "railroading" means railway engineering or railway management. Perhaps both.—Ed.



Church of St. Julien le Pauvre, Paris.—Interior View.

trical engineering, politics, the ministry, and secondary education. To the boy who possesses a patient and independent spirit, a taste for drawing, a correct eye for proportions (*sic*), and a spice of originality, the grand profession of the architect now presents the most enviable opportunities in varied fields."

Dr. White then goes on to show that millionaires are accumulating in America, and he is sanguine enough to think that the fortunes acquired by pork-packing or by dealing in dry goods will be largely spent in the erection of buildings worthy to be called works of architecture. We trust, for the sake of our architectural cousins in America, that these optimistic views may be fully realised. But inasmuch as Dr. White speaks of architecture as a "wide-open" profession,—one, moreover, which is "calling in ringing tones for men to enter,"—and as the editress of the "Children's Page" in the *Co-operative News* commends the Doctor's views as likely to be "of use to English boys," we think it worth while to point out that in this country, at any rate, the profession of architecture is certainly not undermanned at present; indeed, things are very much the other way, and complaints of the "overcrowded" state of the profession increase yearly, despite the corrective administered by the obligatory Examination of the Royal Institute of British Architects. At the same time, we sincerely trust, with Dr. White, that "increasing wealth, taste, and opportunities" are going "to make the architect's profession one in which triumphs may be gained far superior to laurels that can be won on the field of battle," though the sentiment is more to be commended for the excellence of its tone than for the felicity of the language in which it is clothed.

THE committee in charge of the arrangements for the proposed Naval and Military Exhibition in Edinburgh have met with satisfactory encouragement, both as regards guarantee and number of promised exhibits. The Exhibition is to be divided into eight sections: the first embracing paintings in oil and water colour, sculpture, engravings, etchings, photographs, &c., of individuals and of scenes connected with naval and military history. The second embraces arms and armour of all periods, and of all nationalities. Section third is devoted to standards, colours, flags, of all branches of the United Service. The fourth section will consist of medals and orders, and commemorative decorations, naval and military. The fifth comprises military books, music, and musical instruments. Section sixth embraces autograph despatches, commissions, letters, and other documents of naval and military interest. The seventh section embraces naval and military art, including the systems in force at various periods, executed for professional purposes by naval and military officers. The eighth section will consist of relics or memorials not included in any of the previous sections. Should the exhibition prove a financial success the surplus funds are to be applied in aid of naval and military benevolent and charitable institutions. The date of opening is not yet fixed.

MR. AUBERON HERBERT'S long letters to the *Times* as to the state of the New Forest deal with a subject that deserves attention. The New Forest is the last important relic we have (or had) in England of the uncleared forest country, and Mr. Herbert,—who has the good fortune to inhabit that beautiful country,—complains that the character of the Forest is being spoiled by unnecessary enclosures, by plantations of ornamental trees out of keeping with the Forest scenery, and that people are allowed to cut away underwood and to "skin the Forest," as he expresses it, for the consideration of some small fees not worth anything in return for the damage done to the appearance of the Forest scenery. In regard to new work done under official inspiration, he says:—

"We have lately had an expensive system of planting trees of a non-indigenous kind. Many

Pier in the Church of St. Julien le Pauvre, Paris.

has been thrown away in dotting certain parts of the forest with scarlet oaks, limes, sycamores, and, in one instance at least, cedars. Fortunately, the experiment does not seem to have answered. The rate of mortality has been even higher than it usually is among other Government *protégés*. I may say, very fortunately, for it is a crime to change the character of the forest growth. It shows a complete want of appreciation of what the forest is. A few fragments of old woods are almost the one bit left to us of an earlier England,—the England of the greenwood time,—and whatever tricks or experiments you choose to play with the modern plantations of the forest, those old fragments and the open spaces about them should be placed entirely out of the reach of the man of taste. Let 'taste' rule in park, garden, and plantation if it will; but let the open spaces and the few thousand acres that are now left of the older and oldest woods, be treated as a sanctuary in which it obtains no entrance. Moreover, it is to be observed that these young trees have a strangely infelicitous knack of getting planted in the wrong place. Some gap in the woodland is seen, which it becomes at once the mistaken object of the man with a bundle of seedlings under his arm to fill up. Thus the natural beauty of alternating wood and open space is lost; while the hand of taste writes itself in unmistakable and permanent characters by the regular distances from each other at which these young parvenus and intruders are planted."

In which protest we entirely concur, and hope it will not have been made in vain.

WE hear that the Duke of Portland has bought the leasehold house of Sir John William Kelk, Bart., being No. 3, Grosvenor-square, which, we believe, was built by the late Sir John Kelk, Bart., the contractor, for his own occupation. The late Duke of Portland's town mansion was Harcourt House, in Cavendish-square, since occupied by the Marquis of Breadalbane. That house, originally erected for Robert Benson, Lord Bingley, in 1722-3, was bought at his death, in 1731, by Simon, second Viscount and first Earl Harcourt, who sold it to William, second Duke of Portland, by whose marriage (in 1734, at St. Peter's, Vere-street) with Lady Margaret Cavendish Harley—sung by Prior as his "noble, lovely, little Peggy"—only child and heir to Edward, second Earl of Oxford and Mortimer, the Marylebone Estate passed to the Bentincks. At the British Museum is preserved a copy of the original design, "as it was drawn by Mr. [? Thomas] Archer, but built and altered to what it now is by Edward Wilcox, Esq." Though the house has not retained all the somewhat forbidding features which are commented upon in the "New Critical Review of the Public Buildings in London" (1736), when it had no neighbours in the old Oxford-square other than the two wings* of the large building designed, by John Price, in 1720, for the Duke of Chandos, its front wall, courtyard, and *porte-cochère*, and general air of seclusion, have given to it an unusual aspect, less common in London than in the older aristocratic "quarter" of Paris. We may here mention that amongst some houses which have just been demolished along the western side of Holles-street, leading southwards out of Cavendish-square, is No. 16, *olim* 24, wherein Lord Byron was born, and whence he was carried to be christened in what was then the parish church, and is now known as the parish chapel, High-street, Marylebone.

* Those two wings, of which the eastern one remains, by the corner of Chandos-street, are attributed to Shepherd.

A NEW chime of bells, by Messrs. Harrington & Co., of Coventry, has been placed in the belfry of St. Giles's Cathedral, Edinburgh. The chime consists of thirteen tubular bells, including an octave in C, two notes above and one below the octave, and F sharp and B flat. The range permits of a number of tunes, and the new bells are admired in regard to tone, but we are by no means in favour of this class of bell, far inferior in tone to the orthodox bell, though it may do for bells that are only required to be used in chiming, and we are not surprised to learn that this peal is not sufficiently powerful to be heard at a distance of more than a quarter-of-a-mile.

PRELIMINARY arrangements are in progress for the formation of a new theatre in Edinburgh, to be conducted on the lines of the London "Empire" and "Alhambra" theatres. A site has been secured within a stone's-throw of the Theatre Royal, which is now occupied by what was once a dissenting meeting-house called the Tabernacle, and now in use as a furniture warehouse. The new theatre is to be fireproof, and is to afford accommodation for 3,000 persons. It is to be illuminated with the electric light, and to be complete in equipment in other respects. Mr. Frank Matcham is to be the architect.

WE join our strong protest to others which have already been made in various quarters, against the absurdity which has been commenced at the National Gallery of removing the names by which great painters have become famous, but which were not their family names, to substitute these latter names, known only to students. To add the real name in brackets would be quite right, but to expect that the world which has known Claude and Gaspar Poussin and Tintoretto by those names for two or three centuries is going to re-name them now, is a ridiculous and futile piece of pedantry. Who is responsible for it?

ST. JULIEN LE PAUVRE, PARIS.

WE give two illustrations of this remarkable church, to the threatened fate of which we have recently referred. It is the most ancient among the chapels and oratories comprised within the city boundary of Philippe Auguste and Charles V., and the most interesting in its architecture, which presents many analogies with that of Notre Dame.

After having suffered from the devastations of the Norman plunderers, the church became in the twelfth-century the property of a religious community which rebuilt it. It was here that from the thirteenth to the sixteenth centuries the general assemblies of the University were held as well as the elections of the Recteurs of Paris. It is also a tradition that Dante worshipped in this church during his stay in Paris.

The church derives its name from St. Julien the Martyr according to some authorities, or St. Julien the Confessor, bishop of Mans, according to others, and consists of a nave and aisles separated by piers, many of them curious in detail: of one of them an illustration is subjoined. The figures which decorate the capital are almost identical in design with the decoration of a capital on the south side of Notre Dame.

Unfortunately in 1675 the ancient portal was destroyed to give place to an insignificant looking façade with Doric pilasters. The lateral façades have for the most part preserved their original character. The chevêt has massive external buttresses with a modillion cornice over them. The church has four bays only internally, with piers alternately of single columns and grouped piers. The general interior effect, in spite of the small size of the building, is very noble and striking.

The stalls of the choir are still intact, but the altars have been defaced and the statues removed or injured. Among the curious details of sculpture still left is a bas-relief representing a body rising from the tomb. The armorial bearings at the angles of the tomb, as well

as a long inscription, record it as in memory "d'honorable homme et sage maitre Henri Rousseau, Seigneur de Chaillot et de Conflans, avocat au parlement, qne trèpassa en 1445 et donna 100 francs pour avoir se sepulture dans le chapelle de l'Hôtel Dieu."

This was, in fact, the special function of the church until 1793, when the "Terror" closed the doors of all the churches in Paris. It was re-opened for service in 1826, and became the chapel of the old hospital until the latter was transferred to the new buildings in the close of Notre Dame, a few years ago. To-day this ancient church is totally abandoned, and is scheduled among the buildings that are to be pulled down. Sometimes an archæological visitor finds his way along the narrow winding streets in the vicinity to see it; but unless some one will take up the defence of one of the most curious and interesting buildings of old Paris, its days will probably be few. It might very well be made into a kind of historical museum as an annexe to the Carnavalet.

The Société des Amis des Monuments Parisiens, presided over by M. Garnier, has endeavoured to enlighten the Paris Municipality in regard to the value of this monument, and is endeavouring in the meantime to keep it from further decay.

PROGRESS OF THE NEW LOCH KATRINE WATERWORKS.

THE calculations of the Corporation engineers, brought to a practical bearing a short time ago, indicate the approximate space required for completing the tunnelling operations now going on, whereby Glasgow is to be equipped with a second or duplicate water-conduit from Loch Katrine (see *Builder*, February 18th, 1888). Possibly under an exceptionally fortunate train of attendant circumstances the great boring may be accomplished some short distance of time within the limit; but on a fairly generous yet by no means extravagant estimate, three years from the spring of 1889 has been recognised as the earliest likely date of completion. The subterranean cutting is not continuous, but, owing to the configuration of the country traversed, falls into four main sections, according as it is necessary to pierce through the more or less elevated ridges and mountain spurs of Perthshire and Stirlingshire which separate the loch from the Kelvin watershed, on the northern flank of which, eight miles from Glasgow, the tunnelling terminates. As the city is served from this point by gravitation the bore has all the way to maintain a level approximating to that of the parent loch, and the downward gradient is therefore sufficient only to induce the requisite celerity of flow. Four valleys of inferior levels intervene at pretty regular intervals, and these depressions are all passed, partly on the syphoning principle in closed metal piping, and partly by carrying the channel on piers.

Leaving the loch, tunneling begins at once by a cut nearly 1½ miles long, freeing the work from the loftier ridges enclosing the natural mountain basin. This portion is about to be attacked. The Duchray tunnel follows after an interval, and then the Kelty, the contract comprising the latter by this time showing a very satisfactory commencement. Most progress has been made with the Mugdock tunnel, the section which lies nearest to Glasgow, and brings the aqueduct out upon the Kelvin watershed and into immediate touch with the great artificial service reservoirs, Mugdock and Craigmaddie, the former in use since 1859, and the latter now under process of construction. Of this tunnel there remains uncut little more than 400 yards, the total length being over 1½ miles. Unfortunately, of late, there arose a difficulty in maintaining due ventilation within the boring works from the northern mouth, and it became desirable, if not imperative, to cease operations there, the drilling thenceforward being confined to the southern face from Mugdock, where there has arisen no serious cause of complaint on that or any other score.

To the engineers of the Corporation, the construction of the second service reservoir, much smaller though it is, as reckoned on the financial consideration, has been franght with by far the greater load of anxiety. Ever since the start a few years ago, and until recently, the progress attained has been but of the laggard kind. Engineering difficulties have not been wanting, but the first allocation of the contract was not a fortunate one, and hence sprang the greater portion of the vexatious tardiness so long characteristic of the operations. Ultimately the contract had to undergo a very radical re-arrangement, the outcome being that it fell into the hands of a new firm, and since that change was effected the progress made manifest has been on the whole satisfactory to the controlling engineers. The making of the huge embankment works (the heaviest of the sort in the country) is proving a very arduous undertaking, and even on the most sanguine estimate the new reservoir, which is contiguous to the old, and is to be known as the "Craigmaddie," cannot be ready for service for yet a year or two to come. Raising the level of Loch Katrine by a few additional feet, and the laying down of an increased number of supply-pipes between the reservoirs and the city, form the remaining portions of the work necessitated by Glasgow's bold scheme of extension. Only a very small proportion of these terminal sections has as yet been entered upon. It is now fully recognised that the works for a wholesale enlargement of the Loch Katrine possibilities of supply have not been taken in hand one moment too soon. The city, and surrounding water districts with which it is conjoined, have much more than overtaken the margin of inflow and storage deemed in 1856 abundantly sufficient over a stretch of the future at that time hardly regarded as measurable, and should the approaching summer prove a dry one, the population even thus early will be put to rather severe straits.

QUEEN ANNE'S MANSIONS AND THE GUARDS' CHAPEL.

THIS case of dispute as to right of light (The Attorney-General *v.* The Queen Anne and Gardens and Mansions Company and Others), which has not yet reached its final stage, is of so much interest and importance that we think it well to place upon record in our columns the main substance of Mr. Justice Kekewich's judgment delivered last week, as reported in the *Times* of the 18th. The action was to restrain the defendants from carrying their new additions to Queen Anne's Mansions to the proposed height (130 ft. to 140 ft.), which it was claimed would seriously interfere with the light of the chapel. As our readers are aware, the chapel has been in recent times sumptuously decorated internally with mosaics, bas-reliefs, carving, and memorial windows, and internally may claim to be, as the Attorney-General said, a beautiful work of art, whatever may be thought of its exterior. The learned Judge, in delivering judgment, said:—

"Before dealing with those questions which on the evidence and arguments deserve separate consideration, it is convenient to mention some small points with which they ought not to be encumbered. It has been said that the chimneys proposed to be erected on the defendants' buildings will obstruct the access of light. I have known cases in which chimneys and other excrescences either above or at the side of buildings have been important, but that is not so here. If the buildings would not otherwise offend against a reasonable rule, the chimneys will not create such an offence as to justify an injunction or a verdict for more than nominal damages. On the other hand, much has been attempted to be made of the small amount of light at present coming to the chapel. I do not suppose it was intended to be argued that any abstraction was therefore immaterial, for, as was said by one witness, 'the less you have the less you can spare;' but it certainly was suggested, as I have often heard suggested before, that the owner of the dominant tenement, having by his own act deprived himself of light formerly enjoyed, is not entitled to complain of the abstraction of part of the light remaining. In this connexion special reference was made to the wire guards and bars of the windows, which I take to be no larger than reasonably required, the pillars dividing the windows internally, and the arches which separate the nave from the aisles on either side. I fail to understand any such argument. It seems to me little short of absurd to say that because, wisely or unwisely, a man has reduced the light coming to his building to the least he considers convenient, and perhaps to a point beyond what others might consider convenient, he is, therefore, less entitled to claim what he prizes, or is in any way debarred from complaining of obstruction to it. Such a conclusion would be at variance with the absolute and indefeasible right which is recognised in many cases, and particularly in 'Tapling *v.* Jones' (11 'H. L. C.,' 290). These small matters disposed of, I approach the one point of novelty which distinguishes this case from others on the same subject. The building sought to be protected is a chapel, not consecrated, but so unlikely to be diverted from its present use that the possibility may be left out of consideration. It is not denied that the principles by which the Court has been guided in the protection of access of light to buildings used for domestic or commercial purposes are applicable to one used for ecclesiastical purposes, and that material interference with the comfort of worshippers is liable to be restrained as much as that with the comfort more often spoken of in this class of cases. If, in other words, the evidence, properly considered, leads to the conclusion that there will be an obstruction of light sufficient to restrict the limits of time within which persons attending Divine service can read their books without the aid of artificial light, it is not denied that such obstruction ought to be prohibited. And, although little attention was paid to it during the argument, I suppose that the same admission would be made respecting the use of the chapel for those educational purposes to which it is sometimes applied. But it is said that it does not follow from this, and that it cannot be held, that the stained-glass windows and mural decorations are on the like or any principle entitled to protection. The defendants, of course, contend that their proposed buildings will not, in fact, prejudicially affect the windows or walls; but the argument must go so far as saying, and I understand it to be distinctly said, that those windows and walls may be prejudicially affected without incurring liability to injunction. A picture gallery in a private house is undoubtedly entitled to protection, as also a picture gallery in a public building appropriated to that purpose, but I understand the defendants to say that this is because such picture galleries, though not made or maintained with a view to sale, are capable of being regarded as of money value, and, when found in private houses, may be treated as reasonable accessories to the comforts of such houses. It is not suggested that the decorations of this chapel, though costly, have a money value, and their title to protection must depend and was based on a more general principle. This is not the place for discussion whether or to what extent buildings appropriated to ecclesiastical purposes may properly be made the home of works of art of a religious or secular character. This chapel is a peculiar one. It is intended and used for the Brigade of Guards, and, if those who have died in the service of their country ought to be commemorated at all, where can that better be done than in the chapel where their surviving comrades are taught their highest duties? And, if these commemorative pictures are allowable, why should they not be conceived and executed in the most artistic style, and exhibited for the admiration of the public as well as the soldiery? And if they are to be seen and admired, why should not a sufficient access of light be preserved so that this may be done to advantage? I am unable to conceive any reasonable answer to these questions which would assist the defendants' case. There is no exception from the Prescription Act (2 & 3 William IV., cap. 71, sec. 3), any more than there was from the common law, of any class of building from the protection given by law to the access of light. Buildings are divided by the statute into dwelling-houses, that is, those used for domestic purposes, workshops, those used for commercial purposes, and other buildings, and I see nothing to restrict the generality of the third class. A question may occur again, as it did in the recent case of "Harris *v.* De Pinna" (The *Times* Law Reports, vol. 2, p. 529; 33 Ch. Div., 238), whether a given object is a building within the Act, but no question of that kind was suggested here; and, the statute being applicable, the access of light must be protected as much as in the case of a domestic or commercial building, provided, of course, that the title by prescription has been made out, and that the claim falls within the principles by which the Court has been guided in giving relief. I am not sure that Mr. Rigby [Counsel for defendants] intended to press his argument to the conclusion, though it certainly pointed in that direction, that one of these principles is that a plaintiff cannot protect light required for a special purpose unless there has been a user of the light for that purpose during the prescriptive period. There is no authority for any such proposition. It is reasonable to hold, and it has been held, that light cannot be protected for a special purpose unless it has been used for that or a like purpose, or there is a reasonable probability of its being hereafter applied to such purpose. That I understand to be the rule laid down in "Moore *v.* Hall" (3 Q. B. D., 178) which, having regard to the way in which the question was raised, and the Court by which it was decided, must be considered a case of weighty authority, and I certainly deem it conformable to the judgments of Vice-Chancellor Wood in "Dent *v.* The Auction Mart Company" (L. R., 2 Eq., 238), and Sir George Jessel in "Aynsley *v.* Glover" (L. R., 18 Eq., 544), as well as other decisions. The defendants' argument made it necessary thus far to deal with the question of probable user, but the point need not further be pursued, inasmuch as here there has been for at least ten years a distinct user of the light coming to this chapel for the purpose of illuminating

the windows and walls. Assuming then that the defendants are liable to an injunction if the Court is satisfied that their proposed buildings will obstruct the access of light to this chapel so as to materially interfere with the comfort of worshippers, or the proper illumination of the works of art, I have to consider whether this is proved to be, as alleged, the necessary consequence of those proposed buildings. There are two general observations to be made on the evidence, applicable to the witnesses on either side. The expert evidence was, to my mind, overdone. I see no possible advantage in calling so many witnesses to give professional opinions on the diminution of light or its consequences; and the admeasurements of one competent man, or say two at most, are all that can, in any event, be necessary. On the other hand, I was surprised at not having greater assistance respecting the value of diffused light in connexion with such buildings as this chapel, and, in speaking of diffused light, I point especially to its influence inside the chapel when springing from direct rays on the windows or otherwise. The influence of light on colour seems to me to deserve more consideration in this case than it has hitherto received from either side, and this view has done much in regulating my treatment of a point of some importance to the parties which I will presently mention. Again, I think that the evidence on either side is defective in resting overmuch on a line defined by a stated angle up to which obstruction may safely go, or which cannot be safely exceeded. The defendants' witnesses were most in default, for they all adhered to an angle of 45 deg., which has been rejected by the Courts as a conclusive test, and some of them did not venture to state that as their own opinion, but were content to take it as laid down by a large number of their professional brethren. I have never seen a case in which it was more necessary to examine the facts independently of pre-conceived notions, or where expert evidence, based on arbitrary rules, was of less real weight. Mr. Chadwick and Mr. Currey, whom I take as fair representatives of the defendants' witnesses, both admitted that the buildings proposed to be constructed would shut out a certain amount of light, and this they estimated at 10 per cent. of that formerly coming to the chapel, or eight degrees. This is calculated with reference to the centre window, and is an average of the obstruction to all windows. It follows that, as some of the windows are said to be but slightly affected, some must suffer largely to make up the average, and this was admitted. It was, however, contended that 10 per cent. of the full light enjoyed by windows practically unobstructed is not a material quantity so as to make the loss of it a substantial injury to the chapel. That, as an abstract proposition, seems to me a strong one, but it must be considered with reference to the particular circumstances. Before mentioning those circumstances, I will say a few words about the three parts into which the defendants' buildings have, for the sake of evidence and argument, been divided. The eastern tower, standing alone, might be free from objection. It can only obstruct lateral light, and its distance from the chapel is such as to make it doubtful whether such obstruction would be sensible. The defendants' witnesses valued it at 2 per cent. of the full light, and I do not remember any correction of this estimate. But the eastern tower does not stand alone, and I think it would be unfair to regard it as other than a part of the entire building, consisting, in addition, of the central block and western tower. To each of these parts the estimate of 10 per cent. is applicable, and I cannot but think that the estimate is somewhat low. Certainly it is as regards the two western windows, which, it seems to me, must be substantially affected by the western tower, even if no other window is practically affected by any other part of the building at all. I do not think that, as regards Divine service or educational classes, the chapel will be so largely affected as has been anticipated, but there can be no doubt that each day will close earlier than hitherto, and this implies that artificial light will be required on some days when now it can be dispensed with. I think, too, that there will be some increased difficulty in reading on the north side of the chapel. Under these circumstances, and remembering that the chapel is, as agreed on all hands, insufficiently lighted for these purposes already, I think that the Court would be justified in granting an injunction against the threatened obstruction. It is not a case in which the injury could be measured by damages. The more serious injury, however, is that to the stained-glass windows and mosaics. It is said,—and Mr. Seddon must be accepted as an authority on the point,—that direct sunlight is not required for stained-glass windows, and, indeed, he and others who agree with him go so far as to say that the stained-glass will be better seen when the direct rays are obstructed. I observe that their opinion only deals with that part of the window on which the ray falls, and not with the rest of that particular window or with any other windows the illumination of which may or may not be enhanced by the presence of this ray in the chapel. I am not satisfied that the direct light would always be a disadvantage even to the windows, but I will not further dwell on this point. The mosaics on the walls deserve separate consideration, and I think form the most important feature of this part of the case. With reference to this, the chapel is "arranged in a low key of colour," and there is a concurrence of testimony to the conclusion that this was intentional on the part of the architect, and that, while not intending the chapel to be better lighted than it now is, he did not contemplate any diminution of light. To take away even a small proportion of the light now enjoyed by the chapel would be not only to interfere with the artist's conception, but to spoil the effect which he intended to produce, and has produced. In my opinion, the quantity of light proposed to be obstructed cannot, from this point of view, be regarded as a small proportion, and I think that the obstruction will substantially alter the character of the chapel in rendering less visible and less admirable what can now be seen and admired. It is said that these mural decorations can be well seen by gas-light. Perhaps so, and perhaps climatic and other disadvantages make it necessary that they shall often be seen by that light, if at all; but that, in my judgment, is no reason why the light of day coming to them should be obscured. There is one further point made by the defendants, on the evidence, requiring to be noticed. It was suggested by or to others, and admitted by Mr. Blomfield, whom Mr. Seddon supported, that a northern light is the best for these mural decorations, because that light is not direct, but diffused, and therefore more steady, and on this was based an argument that an obstruction to the direct rays, coming through the southern windows, will be an improvement to the chapel in reducing the light thus derived to the level of that coming from the north. This is to misconstrue the admission, in which, be it observed, other witnesses did not concur. Mr. Blomfield was careful to insist on the necessity of a strong light to exhibit the beauties of this chapel, and, though he stated a decided preference for a northern light, I do not find him saying, and it would be strange if he had said, that the southern light is bad because the northern is better. I cannot but think that this attempt to minimise the value of the southern windows by comparison with the northern ignores the obvious fact that the illumination of either wall must largely depend on the windows opposite to it, and it must not be forgotten that, according to the evidence, the rays of the sun passing through the southern windows will not reach the base of the northern wall, which will therefore be illuminated by them without the disadvantage, if disadvantage it be, of their falling upon it. This is a convenient place for mentioning that, as regards Mr. Blomfield and other witnesses who dealt with the effect of light on the interior of the chapel, I have given no weight to any alleged diminution of light to what was called the apse—that is, so much of the chapel as lies east of the chancel screen. I am not sure that any part of it must be materially affected by the proposed buildings, and I am sure that the fresco above the chancel arch would not be. The evidence proves that it can now be seen only by the aid of light which would not be obstructed—that is, late afternoon light coming through the western door, and I do not think that what will be cut off by the western tower need be taken into consideration. A word must be added respecting an effect alleged to be produced by the building as at present existing on the south windows or some of them. It is said that the wall or the scaffolding so obscures a lower portion of at least one window as to divide that window into two parts,—one darkened and the other not, and thus to produce an unsightly result. As against this it is said not only that it is not and cannot be the effect of the present erection, but that the opaqueness of the glass renders it even impossible. That I doubt, but I cannot, on the evidence, hold that any such result as is alleged has been produced hitherto, nor is there evidence to satisfy me that it will be produced in future. There is no occasion for one to refer more than I have already done to any of the cases cited during the argument or any other cases. There was at one time, and not so very long ago, some doubt respecting the principles guiding the Court in arriving at a conclusion whether an admitted or proved obstruction to light is material or substantial, and whether the proper remedy is injunction or damages. I am far from saying that the application of these principles to new circumstances or old circumstances appearing in new combinations may not give rise to many difficulties, and of course I do not say that the principles themselves may not be amplified or modified. But if I am right so far, and the obstruction of access to light to these windows is of the character and extent which I have held it to be, there can be no doubt but that, according to the principles of "Aynsley v. Glover" and other cases, the injury to the chapel is material or substantial, or, in other words, so serious, that if this were an action for damages the jury would be directed to award a large sum; and, it being an action for an injunction, that relief must be granted. The latter view of the case is confirmed by the fact, for fact it certainly is, that no damages would be adequate compensation for injury to the decorations of this chapel. An appeal was made to me by the Attorney-General in opening the case, and by Mr. Rigby at a later stage, to say, if I could, precisely in what manner and to what extent the defendant's proposed buildings would, if completed, be offensive, or, in other words, to define the line of obstruction up to which the defendants may safely go, but which they cannot safely transgress. It was mainly in order to consider this point that I reserved judgment until to-day, and it is not without regret that I find myself unable to accede to so reasonable a request. On full consideration of the evidence, and reflection on the comments on it, I am, as I was at the close of the trial, unable to say with any precision how far the defendants' buildings ought to be reduced in height or breadth in order to avoid that injury to the chapel which would properly be considered substantial. It was to this I referred when mentioning just now the want of more complete evidence as to the influence of light on colour. I do not say a word to place an obstacle in the way of the limit of tolerance, but I am not sure that any concession beyond that would not also be beyond what can be safely granted. I am aware that the limit of tolerance has been fixed by an arbitrary rule, corresponding to a line far short of that on which the majority of architects insist; but, on the other hand, I am sure that the reasonable liberty of the defendants cannot, nor can their offence against the rights of the plaintiff, be limited by any calculation of angles. All the circumstances must be taken into consideration, and these, I think, include some not covered by the evidence adduced before me. One suggestion, however, I can venture to make. It was hinted at by Mr. Rigby during his argument, and I know from experience that it has often proved valuable. I see some difficulty in adopting it in the present case, but, having regard to the large interests involved, I fancy that such difficulty will not prove insuperable, and I need not ask the Attorney-General to render any assistance in his power. I think that if there were a temporary erection following the outline of the proposed buildings, and, observations having been made on the effect of that temporary erection on the access of light to the windows, it were modified, and, if need be, again and again modified so as to allow repeated and corrected observations, it might, and probably would, be possible to arrive at a conclusion what is the fairly allowable limit of obstruction of light coming to the chapel. In the meantime I must direct an injunction in general terms. It will be to restrain the defendants, &c., from erecting their proposed buildings on the south side of the chapel, according to the model, or otherwise so as to interfere with the access of light to the six windows in the southern wall of the chapel.

AMERICAN VILLA ARCHITECTURE.

These are illustrations of several examples of what may be termed the picturesque "villa" style of residence which American architects of late years have treated with great success for small houses in rural or seaside neighbourhoods.

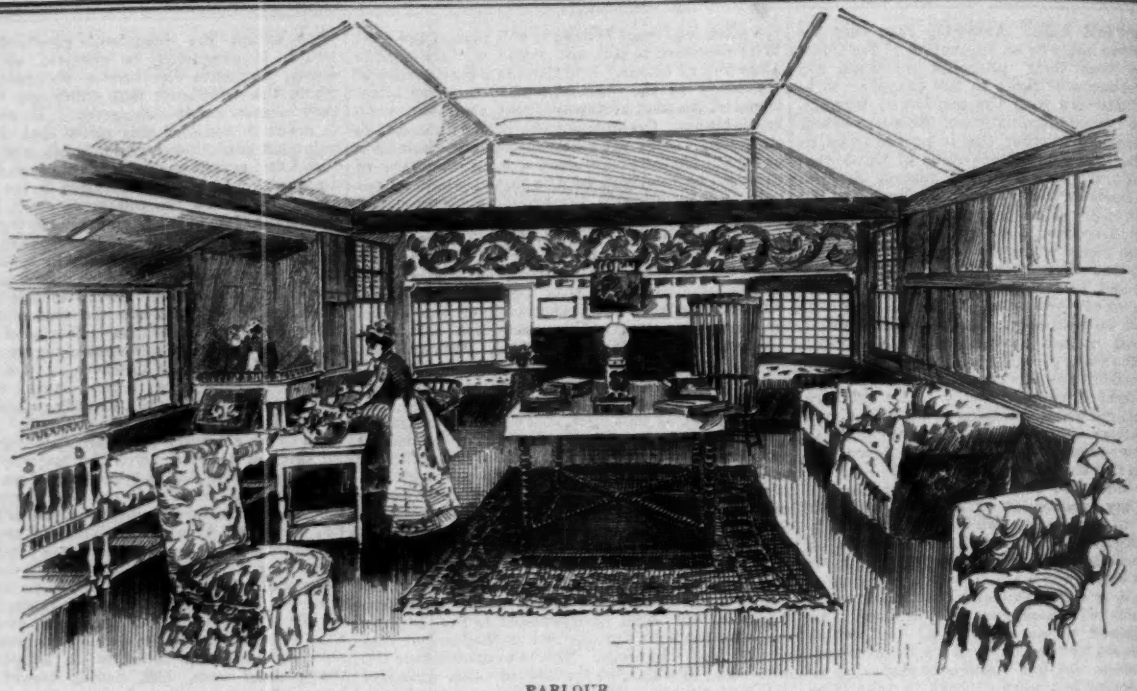
The first two are interiors of parlour and hall in a residence at Manchester-by-Sea, Massachusetts. The idea was that of an old farm-house of the district transformed into a dwelling-house. The parlour, which was an afterthought, is left with the shape of the roof showing within: the room is about 30 ft. long. The walls are panelled with white wood stained very dark, but the chimney-pieces in both parlour and hall are left white. The decoration at the end of the parlour is drawn in white plaster and coloured. The contract price of the house was 6,000 dollars: the parlour added another 1,000. The architect is Mr. Arthur Little.

The residence at Narragansett Pier, R.I., is a sea-side cottage, admirably treated for the situation; simple and yet solid-looking. The architect is Mr. Bruce Price.

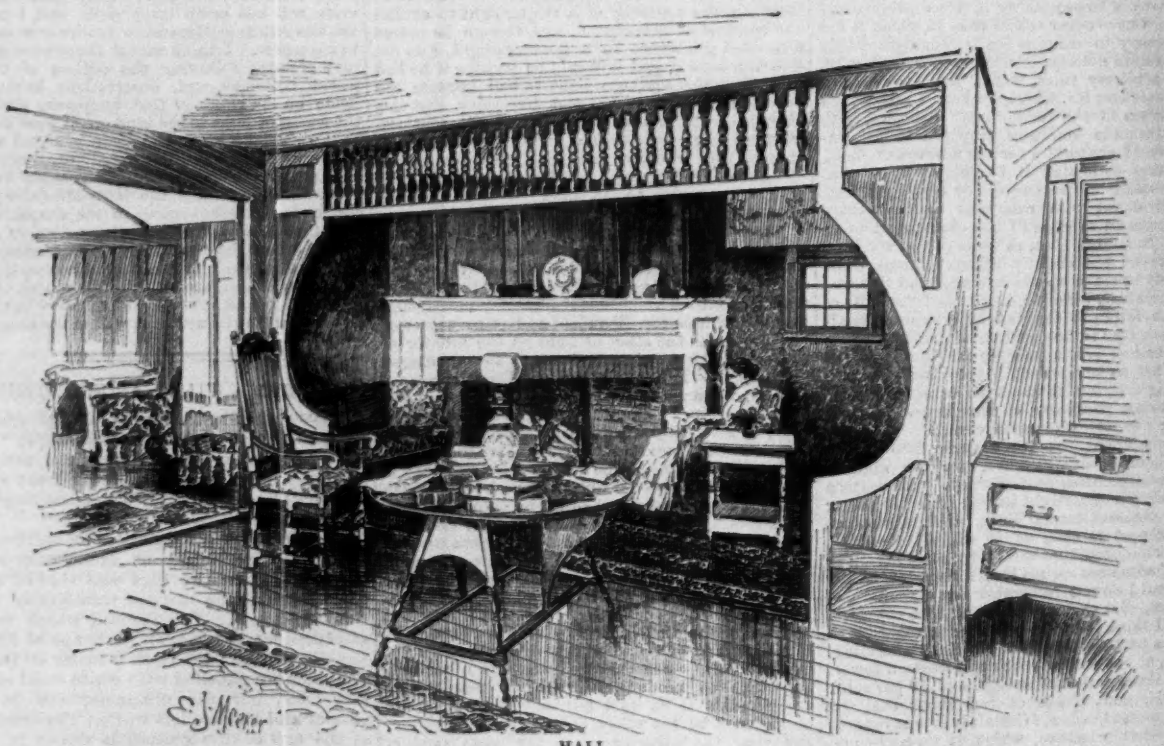
The next two illustrations represent two views of a residence in Far Rockaway, L.I., partly of brick walls and partly of timber: designed by Messrs. M'Kim, Mead & White, of New York.

The Club House at Glen Ridge, N.J., is built of wood covered with shingles. All the rooms are finished internally with hard wood, and the billiard-room is wainscotted to a height of 8 ft., and covered with barrel-vaulted ceiling. The cost of the building was 8,000 dollars. The architect is Mr. W. Convers Hazlett, of New York.

New "Savage Club" House.—Messrs. C. J. Phipps, F.S.A., and W. J. Ebbetts, architects, are engaged to make various alterations at Nos. 6 and 7, Adelphi-terrace, and to change the two houses into a new club-house for the Savage Club. The members will thus return to very near their original quarters by the Caledonian Hotel, Adelphi, and at Midsummer next will vacate their present rooms in Lancaster Mansion, Savoy-place, in the Savoy.

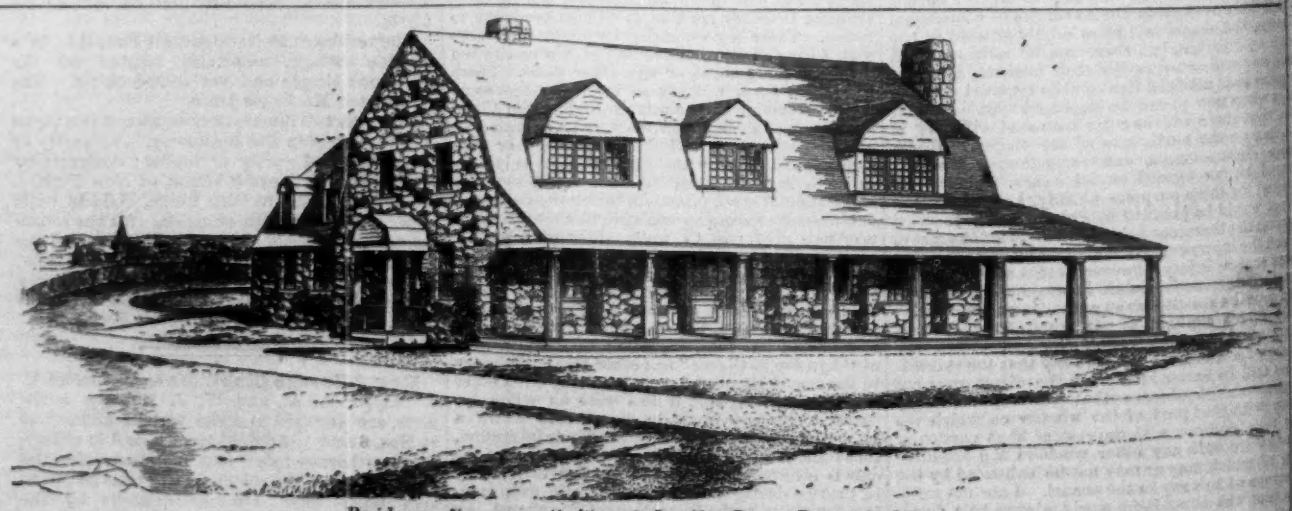


PARLOUR.



HALL.

Residence, Manchester-by-Sea.—Mr. Arthur Little, Architect.



Residence, Narragansett Pier, R.I.—Mr. Bruce Price, Architect.

AMERICAN VILLA ARCHITECTURE.

THE BUILDER, APRIL 27, 1889.

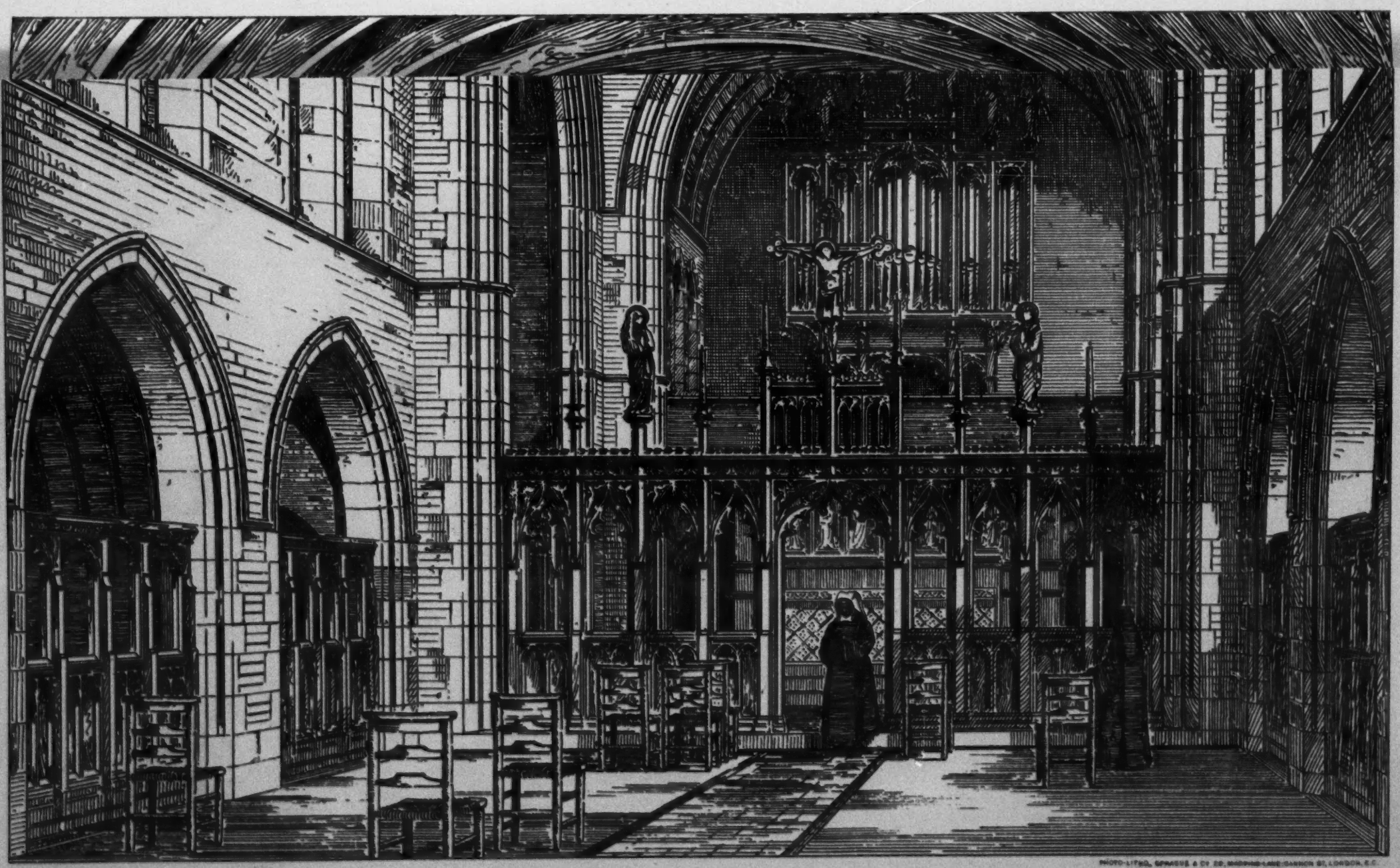
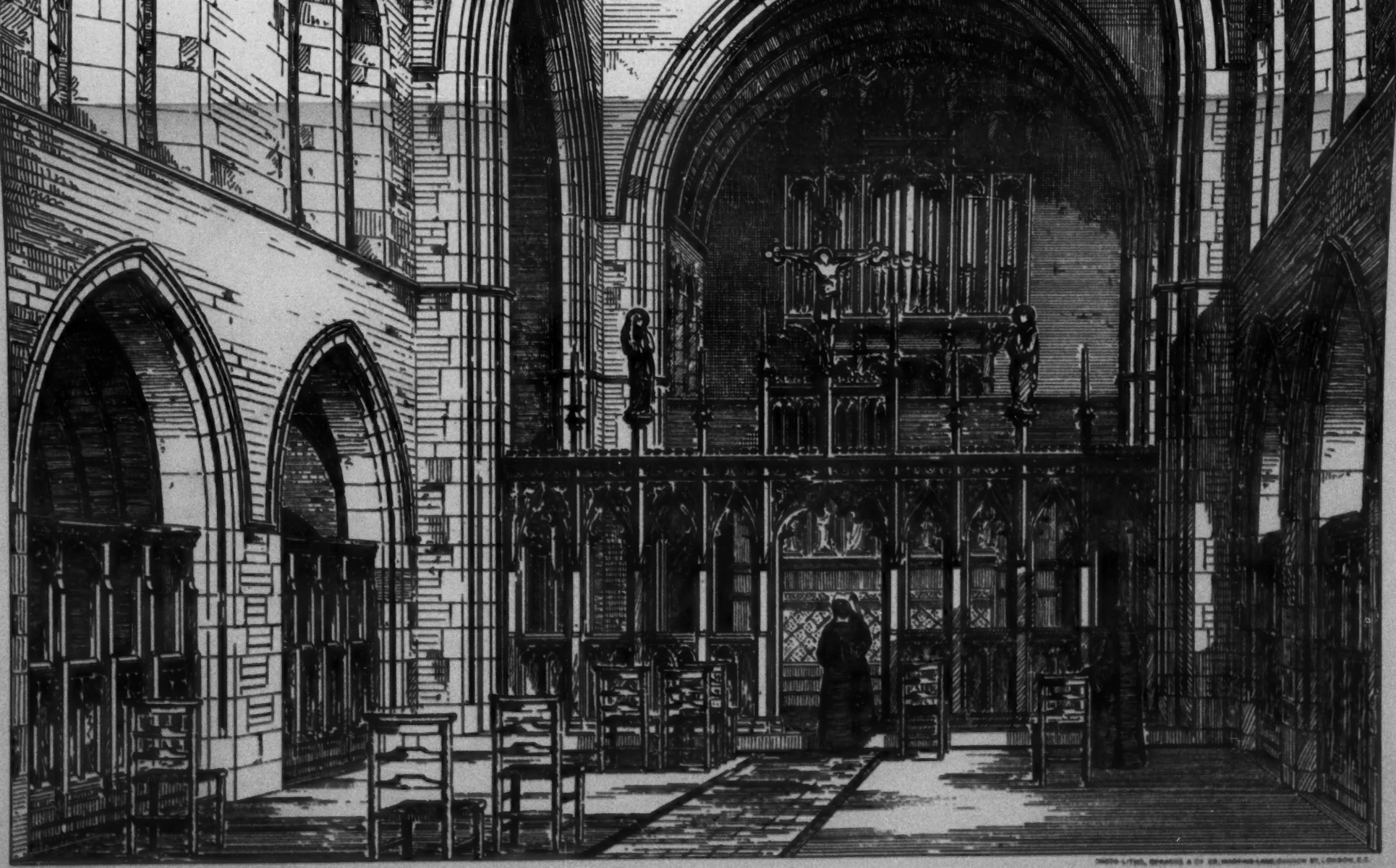


PHOTO-LITHO., SPRAGUE & Co. 20, MARSHALL LANE, GARNON ST., LONDON, E.C.

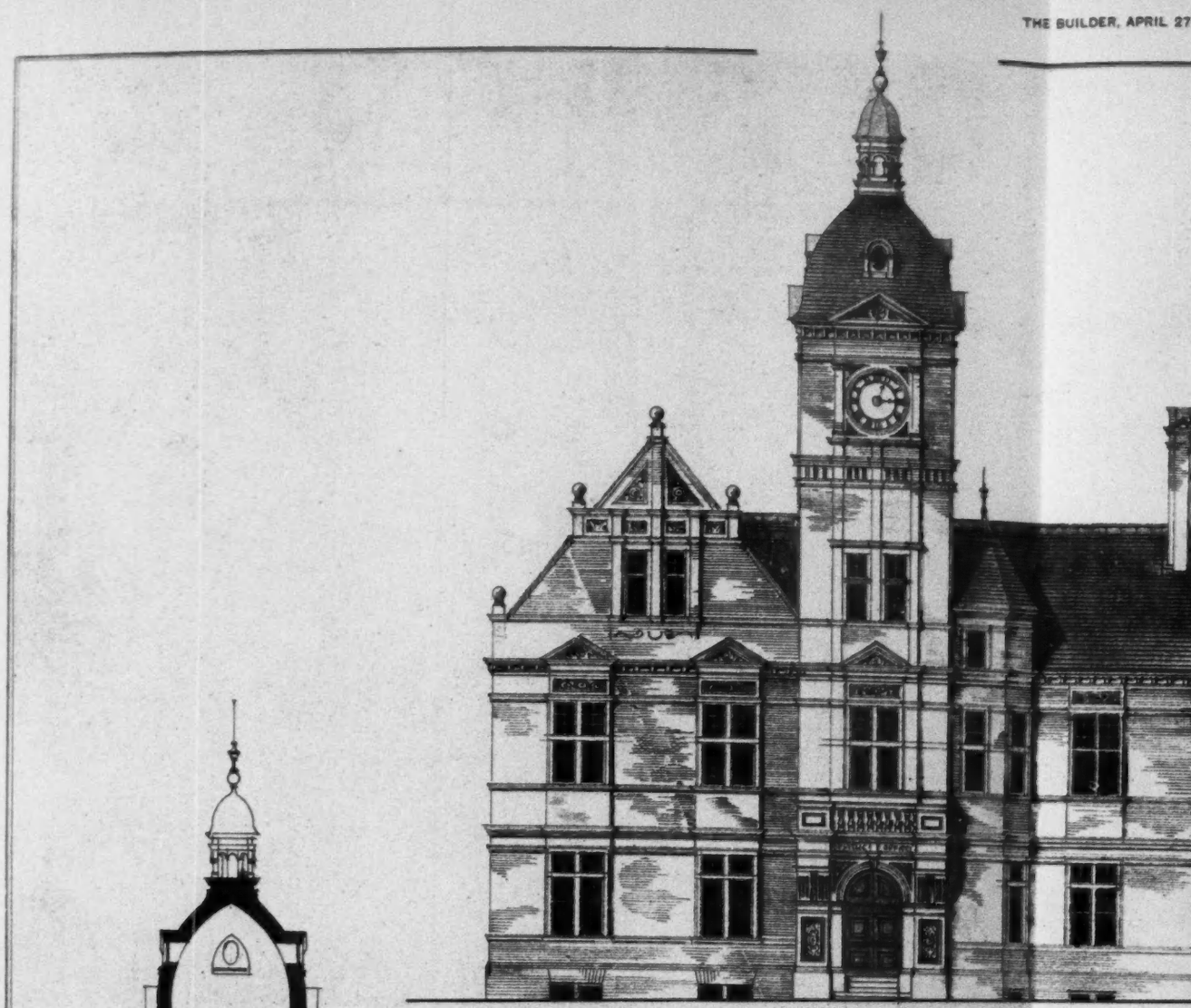
ST. MARY'S ABBEY, MILL HILL.—Messrs. Goldie, Child & Goldie, Architects.

INTERIOR VIEW.



ST. MARY'S ABBEY, MILL HILL.—Messrs. Goldie, Child & Goldie, Architects.

INTERIOR VIEW.



Elevation to Rollesto

SCALE OF FEE

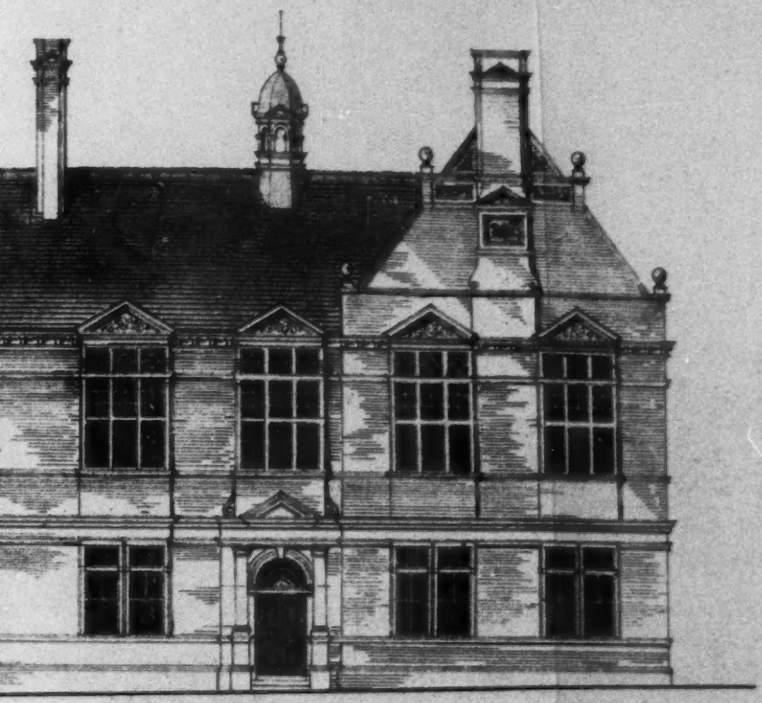
Transverse Section

SWINDON NEW TOWN

DESIGN FOR

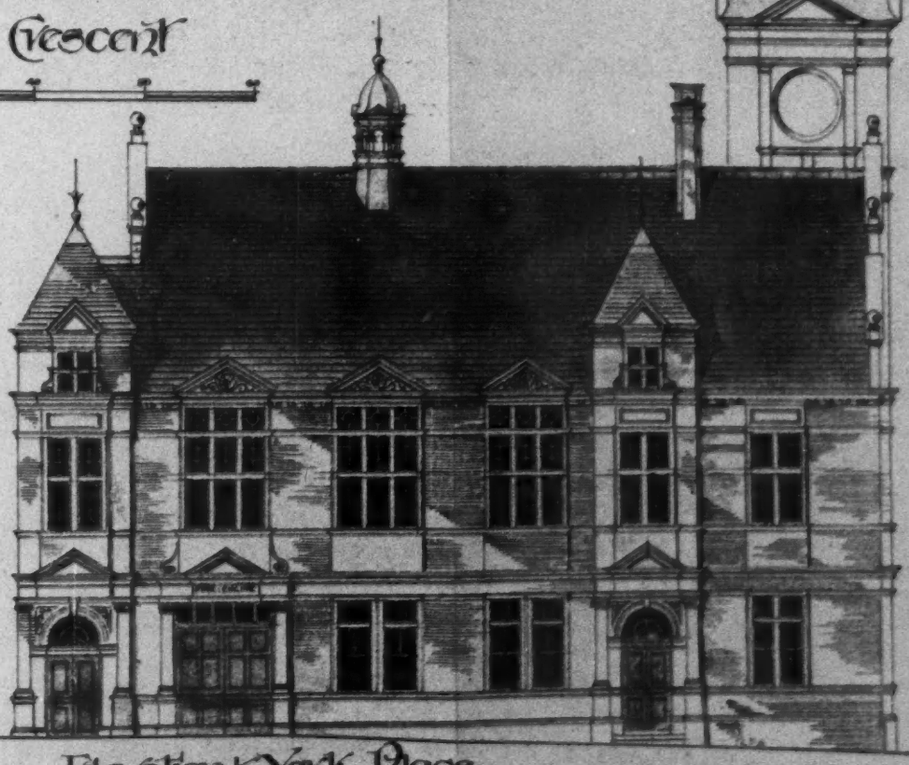
Proposed Public Offices

Mr. Brightwen Binyon A.R.I.B.A. Architect



eston Crescent

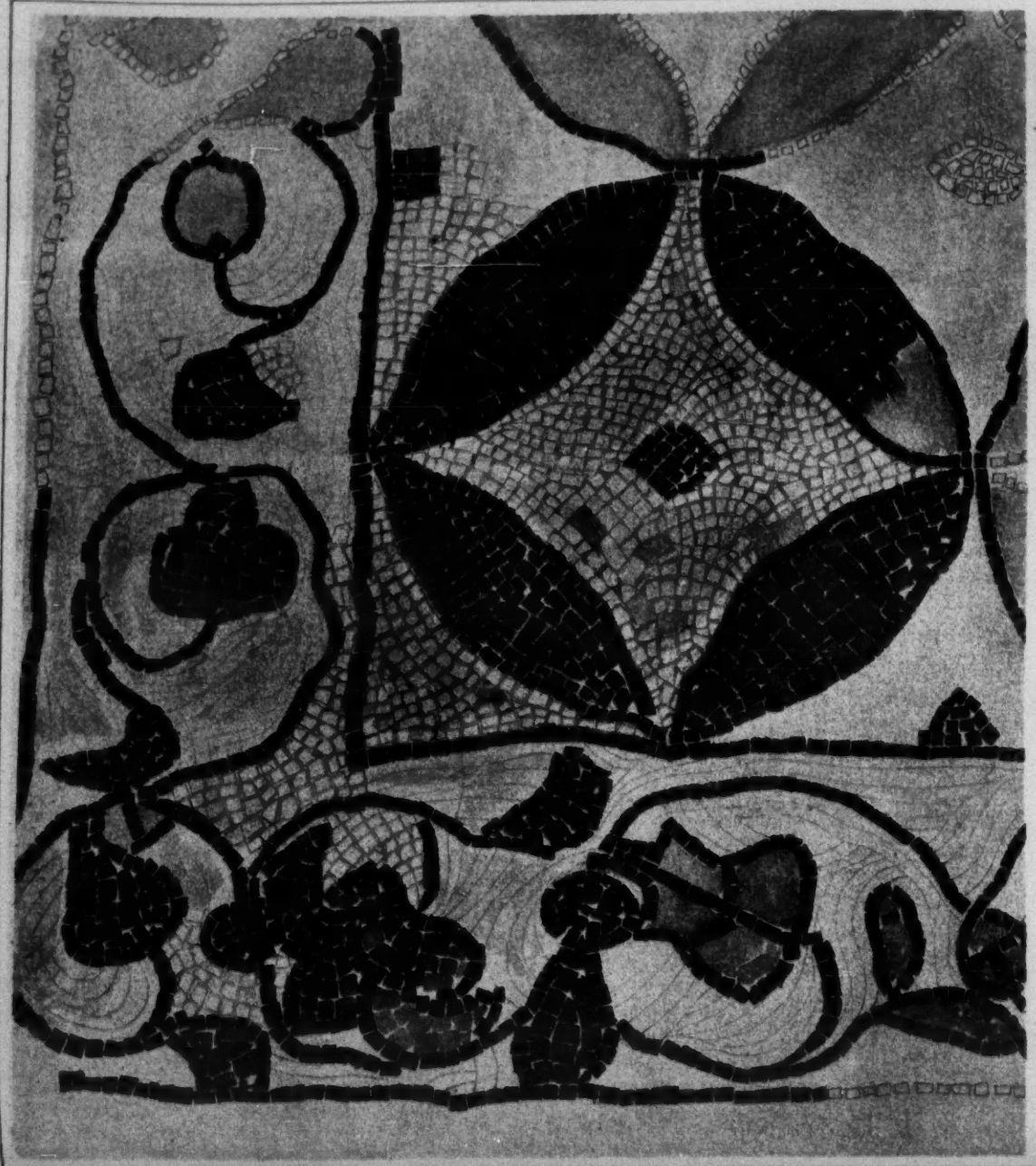
FEET



Elevation to York Place

FRIARS' SCHOOL COMPETITION, BANGOR: DESIGN PLACED SECOND.—Messrs. Oliver & Leeson, Architects

ON PLACED SECOND.—Messrs. Oliver & Leeson, Architects



ANCIENT ROMAN MOSAIC PAVEMENT, SAN ZENO, VERONA.

ANCIENT ROMAN MOSAIC PAVEMENT, IN THE MUSEUM, VERONA.

1. FIRST ATTEMPT.

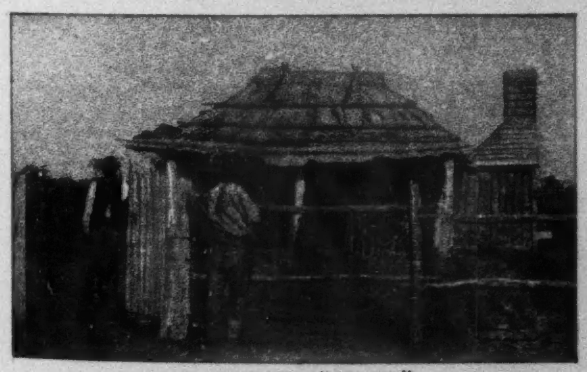
6. A BOARDED HOUSE.

2. EXTENSIVE DEVELOPMENTS.

7. CHINAMENS' GARDENS.

3. A SLAB "HUMPY."

8. RAILWAY OFFICIAL RESIDENCE.



4. IMPROVED "HUMPY."

9. A COURT HOUSE.

5. FURTHER IMPROVEMENTS.

10. A TOWN HALL.

"RIB-PHOTO," SPRAGUE & CO., 28, MARTINS LANE, CANNON ST., LONDON, E.C.

DEVELOPMENT OF ARCHITECTURE IN A COLONY.

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[illegible] PHOTO." SPRAGUE & CO. 45 MARTINS LANE, CANNON ST. LONDON, E.C.

DEVELOPMENT OF ARCHITECTURE IN A COLONY.

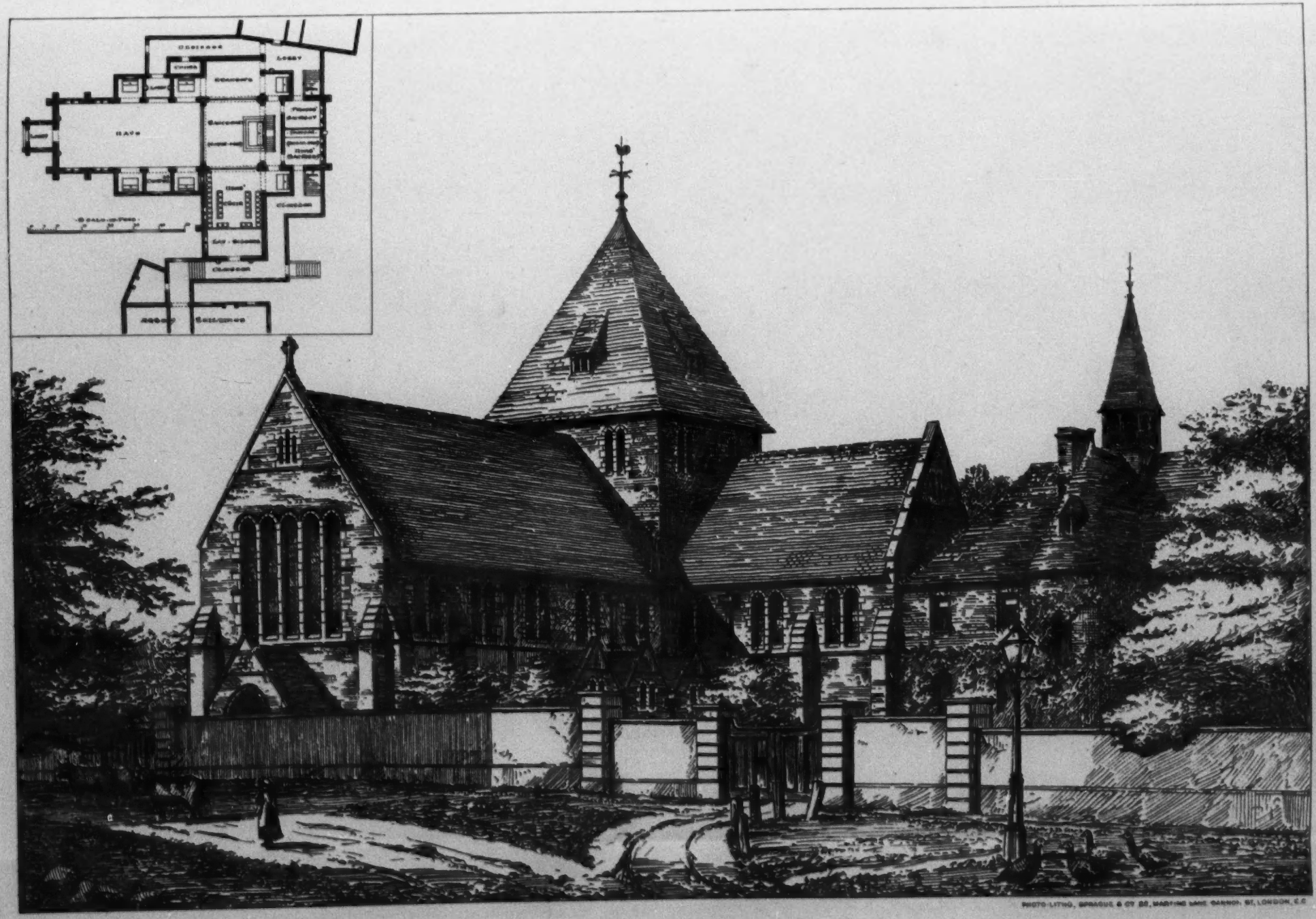
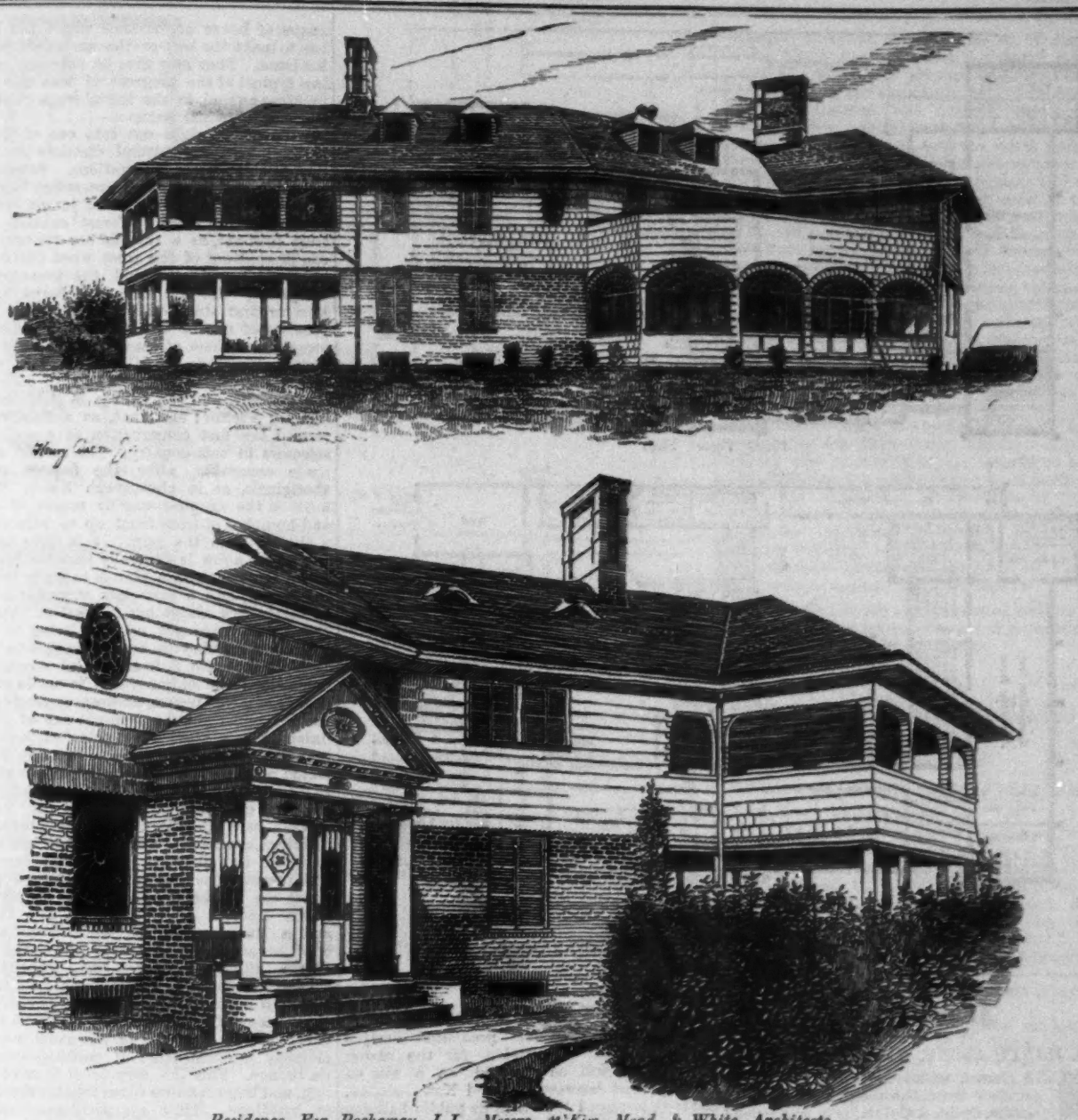


PHOTO-LITHO., SPRAGUE & CO 22, MARTINS LANE CANNON ST, LONDON, E.C.

ST. MARY'S ABBEY, MILL HILL.—Messrs. Goldie, Child & Goldie, Architects.

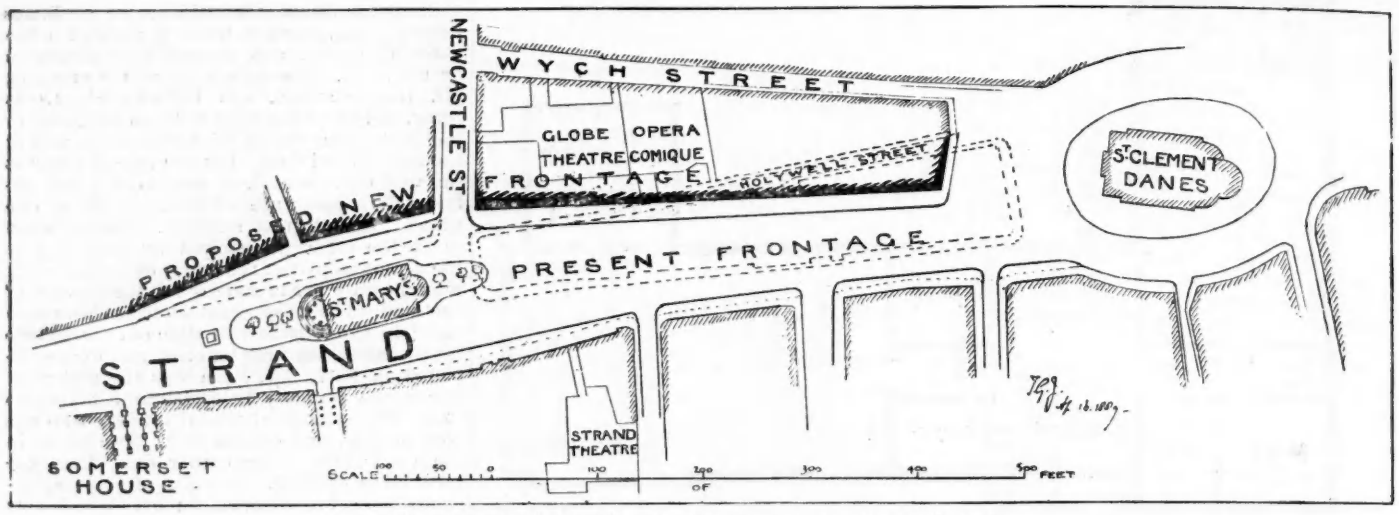
EXTERIOR VIEW.



Residence, Far Rockaway, L.I.—Messrs. M'Kim, Mead, & White, Architects.

Club House, Glen Ridge, N.J.—Mr. W. Conver Haslett, Architect.

AMERICAN VILLA ARCHITECTURE.



Mr. T. G. Jackson's Plan for the Improvement of the Strand.

to avail themselves of opportunities as they came, or such opportunities might not return, and their neglect of them might make their lives failures. "There is a tide in the affairs of men that, taken at the flood, leads on to fortune." As regarded the field in which young engineers were likely to find employment, all of them could not, perhaps, be absorbed at home. He had just returned from India, where, in a tour of about two months, he had travelled 4,000 miles; in that great dependency there was vast scope for the engineer, as there was also in Canada, Australia, South Africa, and our other colonies and dependencies. This he would say with confidence, that England was the best place in the world for the engineer to learn his profession, to get equipped wheresoever his future might be. It would, of course, be the best equipped men, not necessarily those with certificates, although these were valuable, but those who had the best general record, who would be preferred, and engineers having the power to help young aspirants had means of learning the moral and other qualifications of candidates for employment.

With respect to the Forth Bridge, Sir John supposed that it would be expected, from his position, that he would say something about it. It would be easier to talk about it for two hours than to refer to it satisfactorily in a few minutes. The principal peculiarities of the structure arose from the width of the spans in the deep channel, necessitating construction on the cantilever principle. These spans were each of 1,700 ft., or nearly a third of a mile, twice the span of arches in any other bridge in the world. The piers from which the cantilevers spring are built in 60 ft. of water, below which, of course, the foundations are laid. The piers on the south side are founded on glacier clay; the north piers are on sloping basaltic rock. In cutting down in this intractable material, serious difficulties were encountered, owing to the enormous quantity of water that came in upon the excavation from a fissure in the rock. Good foundations had eventually been laid at every point. It might have been thought that massive squared masonry would have been the chosen material for these piers, but it was not so; the material was of rubble, with mortar of the highest quality. The bed-plates on the tops of the piers above high water were enormous masses of metal, upon which the steel piers are carried up, and from which the cantilevers sprang. In the construction of the bridge itself, the permanent work provided scaffolding for the work as it progressed. The completed arms of the cantilevers left level spaces to be filled up for the line of roadway of about 350 ft. each, and different methods of getting these portions into position had furnished matter for grave consideration. It had, after carefully weighing the merits of different methods, been determined to continue in the same course as has been pursued, and to build the level portion piece by piece from the ends of the cantilevers, until the space is filled and the junction completed. It was hard for any one to understand the character or principles of construction of the bridge without seeing it, and he could promise that any of the students or their friends paying it a visit would receive the attention and facilities they might need to enable them to arrive at an adequate understanding of the subject. Sir John mentioned, in evidence of the magnitude of the work, that it required in the construction upwards of 50,000 tons of steel, 50,000 tons of granite, 22,000 tons of cement, and 200,000 tons of concrete and masonry.

The Chairman then proceeded to present the certificates to the students.

The highest award on this occasion was the Bronze Medal of the Crystal Palace School of Art, Science, and Literature, to Mr. C. G. Angus, student, who had fulfilled the conditions entitling him to it, in having obtained, during his course through the School, nine certificates,—the largest number obtainable,—none of them below the third order of merit. It may be mentioned that the last of the nine certificates awarded to Mr. Angus was for the term that day ended, the Examiners returning him first in the order of merit for work in the third term of the second year's course.

The lectures for the term were on "Steam and the Steam-Engine." Forty-four students attended the lectures, thirty-seven were eligible for examination; twenty-two of these passed satisfactorily. The highest number of marks attainable is 288. Mr. A. Struben was first with 260 marks, and was also second for work in the Fitting-shop. Mr. W. G. Wales was second for Lecture examination, with 254 marks, and first for work in the Pattern-shop. In the Drawing-office fourteen certificates were awarded, Mr. A. H. Roberts first. In the Pattern-shop fourteen certificates, Wales, first (see *ante*). In the Fitting-shop fourteen certificates, Mr. E. M. Proes first, also third for Lecture examination, with 246 marks.

In the second year's course,—Civil Engineering,—for students in the first term,—Practical preparation, by actual surveys, levelling, &c., of plans in detail for Parliament, of a railway and dock,—ten certificates were awarded, Mr. P. B. Mottey, first. To students in the second term,—Working sections and the specifications, working plans, calculations, estimates, &c., of detail of work, for the contractors,—six certificates were awarded, Mr. D. A. Andrus first. To students in third term,—Original designing of the higher examples of bridges, &c., and the general application of principles in practice,—seven certificates were awarded, Mr. C. S. Angus (medallist) first. Three certificates of the first grade were awarded to students in the Colonial Section.

The usual votes of thanks terminated the proceedings.

THE CHURCH OF ST. MARY-LE-STRAND.

SIR,—In order to carry the discussion of the widening of the Strand and the removal or preservation of St. Mary's Church a step further, I venture to send you a rough plan to show how I should propose to realise the suggestions made in my letter to the *Times* of April 10, on which you comment in your issue of April 13.*

The plan is taken accurately from the Ordnance Map, and shows by dotted lines the position of Holywell-street and the houses now lining the north side of the Strand between the two churches. The improvement, obviously, cannot end with the mere removal of the houses between the Strand and Holywell-street; the street would then be as much too wide as it is now too narrow, and the houses on the north side of Holywell-street would not be worthy of the new frontage. Moreover, the obliquity of St. Clement Dane's Church makes it unfit for the centre of the new street. Clearly, under any circumstances, the north side of the widened Strand would have to be rebuilt somewhat in advance of the north side of Holywell-street, and the direction of the new frontage should align or nearly so with the flank of St. Clement's Church, so as to conform to its obliquity.

It is at this point that the question presents itself, what is to be done with St. Mary's Church? If it is destroyed, the houses now standing to the north of it will remain, and the new frontage will be on a line drawn from them to the corner next St. Clement Dane's. But as the whole frontage east of Newcastle-street must be rebuilt, it will be easy to give it the direction shown on my plan so as to avoid St. Mary's Church entirely, and leave a roadway north of it equal to that on the south. It is true that in order to do this the houses north of the church must be pulled down and the frontage thrown back, but against this expense must be set that of rebuilding St. Mary's Church elsewhere if it were pulled down, and the probably still greater expense of providing a site for it in so densely crowded a district.

It will be seen by the plan that the deviation from the straight line would be nearly uniform on both sides of the church, so that the island on which the church stands could not possibly impede freedom of locomotion. The pavement round it would form the necessary landing place, which might be prolonged eastward as it already is westward, and afford space for a second clump of trees. The new street would be of a noble width, and besides a splendid roadway for wheeled traffic, would give room for a footway on each side three times as wide as the present one, the narrowness of which is at least as great an evil as that of the roadway. The greatest width of the street occurs opportunely just opposite the entrances of three theatres, whose audiences, coming out at the same time, now contribute so much to the nightly congestion of the traffic.

On the practical side of the question, I submit that the retention of St. Mary's presents no difficulty. On the architectural side, I need add little to what I have already said. It is of no use arguing with those who think a street cannot be comely or convenient unless you can see from end to end of it; and one cannot find eyes for those who are blind to architectural beauties at their own doors which they would admire on the other side of the Alps. No one, however, can fail to be struck by the practical unanimity of those who are qualified to speak as artists in favour of the preservation of one of the happiest monuments of the English Neo-classic style.

T. G. JACKSON.

* It is due to Mr. Jackson to say that his letter and plan were sent to us before the publication of Mr. Nevill's in our last issue; but as in Good Friday week it is necessary to go to press a day earlier than usual, his plan was unfortunately too late for production in our last issue.—ED.

Copy of Mr. Stanger's Report on Tests of Lindsay's Fireproof Floor Bricks.

Modulus of Section, 7·26. BEAMS. Moment of Inertia of Section=16·33.

Span in inches.	Breaking Load in Centre.			Calculated Stress on Outer Layer. Per sq. inch.		Remarks on Fractures.
	Tons.	Cwt.	Lbs.	Tons.	Lbs.	
20	0·620	12·40	1,389	0·427	956	Two small stones in fracture. One on the neutral axis, one in tension member.
20	1·100	22·00	2,464	0·758	1,697	Two small blow-holes. One near neutral axis, one in tension member.
	Corrected to 20-inch span.					
17	0·582	11·64	1,303	0·401	897	Small stone in compression member.
Mean of the above	0·767	15·34	1,718	0·528	1,183	

COMPRESSION.

Length.	Sectional Area.	Load on Brick.		Cracked.	Load on Brick.		Crushed.
	Sq. Ins.	Tons.	Tons per Sq. In.	Tons per Sq. Ft.	Tons.	Tons per Sq. In.	Tons per Sq. Ft.
9½ in.	7·33	13·52	1·845	265·7	18·58	2·535	365·0

FIREPROOF FLOORS.

SIR,—I noticed in the columns of your last issue a most surprising misstatement by Mr. Fawcett. He states that his "tubular lintels" will sustain more than double the load that mine will, which may be correct in one sense; but, on the other hand, he entirely omits to say that *each of his bricks covers about* 2¾ times the floor area of mine. Hence, in order to compare his bricks with mine, his loads must be divided by 2¾, which will show a decided advantage in my favour.

I enclose Mr. Stanger's report on the tests of my bricks; and, in justice to myself, I hope Mr. Mark Fawcett will do the same, so that a comparison can be made. WILLIAM LINDSAY.

SIR,—I am compelled to ask you to allow me to correct some other misstatements made by Mr. G. M. Lawford in your last issue. He says that my tubular lintels are bricks, that they are 2¾ times the size of Mr. Lindsay's, and that they were both tested in the same way.

There is no resemblance between my tubes and bricks; to make them even 2½ times the size of Mr. Lindsay's, the extreme width of the bottom, including the lateral flange, would have to be measured (this would be an absurd way to measure, unless the strength of the concrete, *which in my floor forms a lintel in itself between each tube*, is also added to the strength of the tube); one of my tubes (the fireclay one) was not tested in the same way as Mr. Lindsay's, *but*, as it would be in actual use, and broke off at the bearing with a central load of 28 cwt. on it, clearly showing that they are the weakest there. The other two (at Mr. Lawford's suggestion) were tested in the same way as Mr. Lindsay's had been, for the purpose of comparing the strength with his, and I protested at the time that the test was of no other value; they broke with 26 and 30 cwt. on them respectively. Mr. Lindsay's broke with 11, 12, and 21 cwt. on them respectively, and although there was this enormous difference, a mean strength of 15 cwt. was claimed for them. MARK FAWCETT.

April 23, 1889.

The Student's Column.

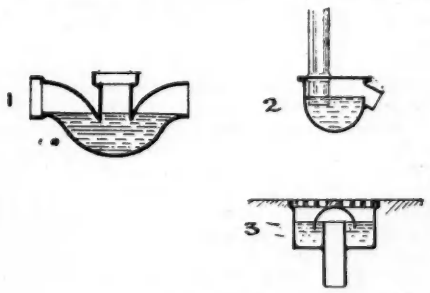
TOWN DRAINAGE.

XVII.—TRAPS: AND SOME PRECAUTIONS.

WHEN the depth of a drain is not greater than will admit of the intercepting or disconnecting trap being easily reached from the surface, we have shown how the bottom of the air inlet may be formed with bricks, upon which a vertical pipe may be carried up (art. viii., Feb. 23), also how the waste water from a sink in the basement may be discharged into a gully outside (xiv., April 6), with brickwork, upon which a smaller air-inlet pipe may be set and carried up to the surface. But traps are made, for those who prefer them, which combine the three necessary openings, viz., that (1) to receive the end of the horizontal drain-pipe, (2) the outlet of the trap, and (3) the pipe which conveys the air down from the surface to the drain. In the article No. iv. five forms of trap are drawn: the second and third are of the form which combines the three openings just named. As usually made, the vertical opening is no larger than the horizontal inlet and outlet, being only 6 in. for a 6-in. drain. They require, therefore, a taper pipe to be first set into the socket to expand the size of the air-inlet pipe to that required, viz., 12 in. diameter. In making the traps, however, it would be better to form this vertical opening large enough to receive at once the 12-in. air-pipe, without the necessity of employing taper pipes. By some makers the vertical opening is, indeed, now made larger than the horizontal inlet and outlet, when the trap is used as a gully at the surface of the ground, and covered with a grating. It requires only that it be made round instead of square in order to suit the purpose named.

The form of trap 1 in article vi. is called a siphon trap. Like some other terms used in house-drainage, it is inaccurately applied to such a form. It would be a siphon if turned upside down, and the sewage were made to rise over it by a greater pressure of the air at its inlet than at its outlet; but, used as it is, it is simply a dip trap, and acts on the same principle as the older form of mason's trap, as it is now called, which consists of a square tank across which is set edgewise a flagstone, which dips into the water standing in the trap, thus cutting off the passage of air from one to the other side of the dip-stone. In some other parts of a system of drainage siphonic action does take place, and it is, therefore, regrettable that the term siphon should have been applied to this water-trap.

There is a form of siphon trap to be seen in many builders' yards and other places,—and, unfortunately, sometimes used also,—which should never be used. As stoppage of the flow of sewage may sometimes occur in a siphon trap, for reasons stated in art. vi., it has been attempted to give access to the trap by forming a vertical branch in its middle, as in the accompanying fig. 1, a stopper being placed in



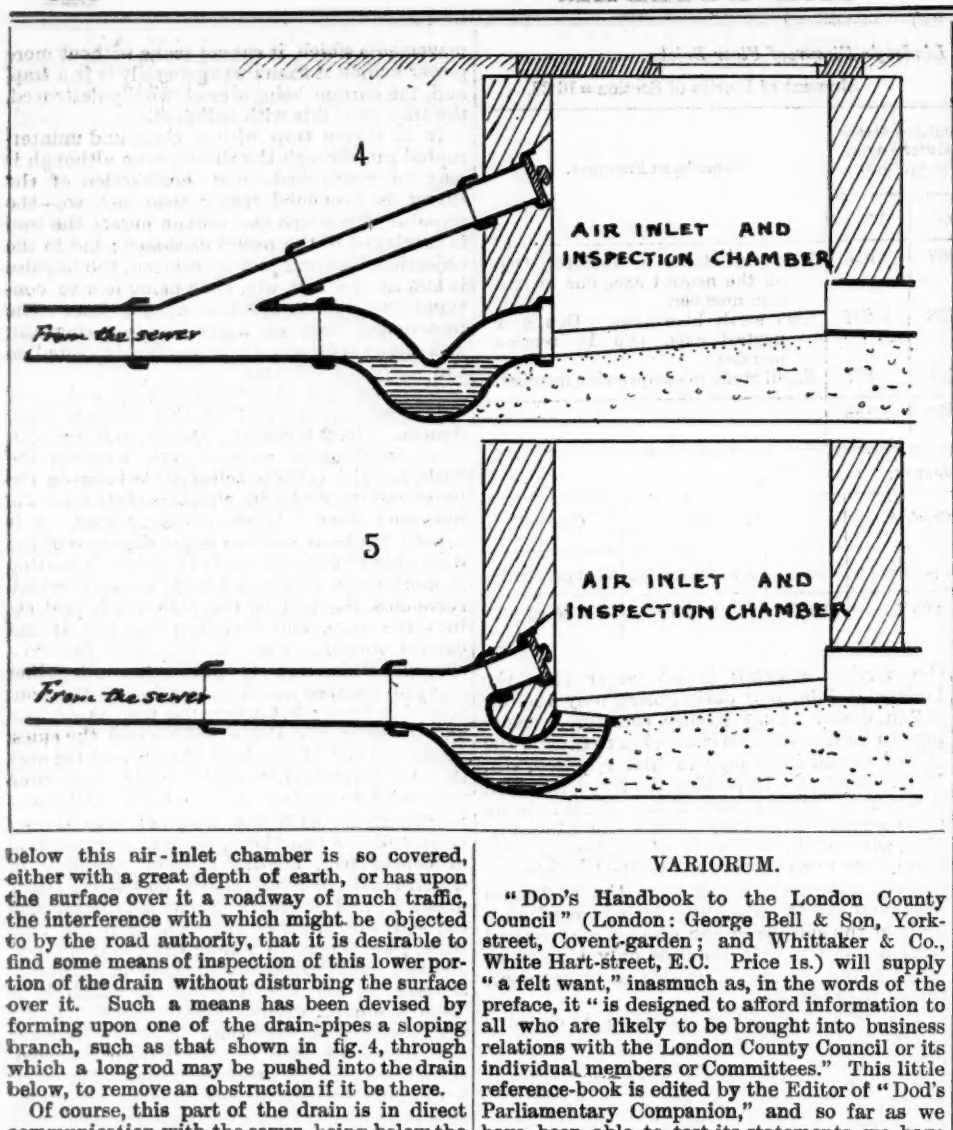
the socket when the ground is intended to be filled in over the trap, or, in other cases, a pipe or two is carried up from it to the surface of the ground, to afford a ready means of access for clearing out accumulations of dirt in the trap. But, as we have said, this form of trap should never be used, for at the very point where of all others an easy passage of the sewage is most necessary to be provided, —that is, in the throat of the trap,—a re-entering angle is here opposed to its passage, and instead of the flow of sewage following an easy curve, it must pass first downward, then upward, and downwards again before it can finally escape and pass away. But these are movements which it cannot make without more power behind it than there generally is in a trap, and, the current being almost wholly destroyed, the trap soon fills with sediment.

In a siphon trap with a clear and uninterrupted run through the throat, even although it may be contracted,—and contraction of the throat is beneficial rather than not so,—the impulse with which the sewage enters the trap is continued to the outlet unabated; but in the objectionable form just mentioned, the impulse is lost at the first dip, none being left to continue the flow under the second one. The intervening body of water becomes stagnant, and allows sediment to be readily deposited on the bottom of the trap.

There are two other forms of trap which are objectionable,—2 and 3 of the accompanying figures. No. 2 is called a D-trap, and has been much used under water-closets, between the basin and the vertical soil-pipe, or between the basin and the drain in closets situated on the basement floor. When made of lead, as it usually has been, and too large, the force of the discharge of water through it is lost in putting in motion the extraneous body of water which surrounds the end of the pipe which projects into the trap, and therefore the soil is not carried forward with the water. The flow through this trap is not often altogether stopped, because the discharge into it has considerable force; but when the trap is of lead and too large it collects soil around the sides, which are out of reach of the current through it. Its form is not continuously the same from inlet to outlet. It has been mostly used in connexion with the form of water-closet basin called a pan-closet, wherein a tinned iron or copper pan, holding a small quantity of water, is hinged to one side of an iron container under it, and in which it swings, discharging the soil through the container into the trap below; but the large size of the iron container, and the irregularities of the line of discharge through it, and the material of which it is formed, are all objectionable, resulting in its continually foul condition. Neither iron nor lead should be used for the two parts named. Earthenware is the proper material. The other form of trap which we said was so objectionable,—fig. 3,—is called a bell trap, and used to be always used on the surface, either at the mouth of the discharge-pipe or waste-pipe of a scullery sink or other such sink, or else at the surface of the ground over a sewage-inlet to the drain, in the place of a gully. The objections to it are that it soon becomes clogged with dirt, there being too much surface of iron exposed to the passage of the sewage in proportion to the dimensions of the waterway, and the course which the waste water must take being so irregular; first under the lip of the bell, and then over the edge of the outlet pipe. This objection applies whether the grating which covers it is loose or is hinged to one side of the trap, but with a loose cover there is the additional objection that the frequent stoppage of the trap induces people to throw the cover aside, thereby opening a direct communication with the drain; and even with a hinged cover it is but little better than when the cover is loose, for it is easily thrown back and the pipe left open. In all parts of house-drainage it should be considered that they are under the command of persons who know little about their construction or the effects of interference with loose parts, and therefore, unless it be absolutely necessary, no part should be so formed that it may be inadvertently removed.

The brick chamber shown in art. xiv., the place of which is at M on the sketch plan, serves the purpose of inspection of the drain under the house floor in case of stoppage or leakage, without unnecessarily disturbing the floor in the first instance. By taking up the small flagstone at N, and removing the sealed cover of the upright junction pipe, this length of drain can be tested, and it can be quickly ascertained whether any further disturbance is necessary. If the drain be found to be water-tight and free from obstruction, it is a great relief of anxiety, for it disposes of the main portion of the drain, and the inspection chamber is found to be a good appliance and well worth what it has cost to make it; but its chief purpose is to let fresh air into the drain-pipe, which traverses its whole length to the ventilating pipe at the far end; not rapidly, but with a sufficient degree of movement to keep the air of the drain free from stagnation and consequent foulness.

Now, there are situations where the drain



below this air-inlet chamber is so covered, either with a great depth of earth, or has upon the surface over it a roadway of much traffic, the interference with which might be objected to by the road authority, that it is desirable to find some means of inspection of this lower portion of the drain without disturbing the surface over it. Such a means has been devised by forming upon one of the drain-pipes a sloping branch, such as that shown in fig. 4, through which a long rod may be pushed into the drain below, to remove an obstruction if it be there.

Of course, this part of the drain is in direct communication with the sewer, being below the intercepting or disconnecting trap of the house-drain, and the air in it may be foul: at any rate, it is as bad as, and probably worse than, the sewer air. The end of this branch, therefore, in the air-inlet chamber is closed with an air-tight plug, which is removed only when inspection is necessary. That is to say, it should not be removed at any other time, and especially should not be left out of its place for any length of time. Any workman who may be employed about the drain knows that the end of this branch should remain sealed, and he will see that it is so as long as it is under his eye, but, for the same reason that a loose cover of a bell-trap is a dangerous thing, so is this. Any one may remove the iron grating and look into the air-chamber to ascertain whether anything is amiss there, and may enter and remove the plug if he thinks that will do any good. This appliance, therefore, should not be adopted without due consideration. There are cases where the care of the house drainage can be entrusted to a responsible person, who will take care that nothing be interfered with unnecessarily. In these cases it is safe, and where it is safe it is a great convenience to have this means of inspection of the lower portion of the drain. The figure 5 is for the same purpose, and may be a little better than 4, or not so, according to circumstances. The second figure in art. xv. shows an air-inlet and inspection-chamber, which may be safely applied anywhere, and which is sufficient for all situations unless it be in some districts of London where the house drains have been connected with the sewer in a more than usually inefficient manner, making that portion of the drain between the front area and the sewer unusually liable to stoppage, either from want of fall in the drain or leakage from the joints; but London is not all England, and except where the conditions in other towns resemble those of the districts of London situated on gravel-beds, where the house drains have but little fall,—say, 1 in 100 or 120,—and where the joints of the drain pipes below the intersepting trap have not been made water-tight; except under these conditions and those we have before mentioned, an inspection opening of the kind is not so requisite as is sometimes represented.

VARIORUM.

"DOD'S Handbook to the London County Council" (London: George Bell & Son, York-street, Covent-garden; and Whittaker & Co., White Hart-street, E.C. Price 1s.) will supply "a felt want," inasmuch as, in the words of the preface, it "is designed to afford information to all who are likely to be brought into business relations with the London County Council or its individual members or Committees." This little reference-book is edited by the Editor of "Dod's Parliamentary Companion," and so far as we have been able to test its statements, we have found it to be, on the whole, exceedingly accurate. The names, ages, occupations, and antecedents of the aldermen and councillors are given, together with the number of years the aldermen have to serve (some being elected for six years; others for only three years). The results of the polling at the elections (the numbers of the votes recorded and the names of the unsuccessful as well as the successful candidates) are also given, and the names of the chairmen of the twenty provisional committees are separately set forth. We cannot here attempt anything like a complete analysis of the *personnel* of the Council, but it may be of interest if we mention that it contains two architects, Mr. R. W. Edis, F.S.A. (not "F.R.S.A." as it is erroneously put), and Mr. F. S. Brereton, F.R.I.B.A.; four builders,—Messrs. G. Bethell Holmes (Chairman of the Building Act Committee), J. Marsland, R. Roberts, and L. Stevens; one civil engineer,—Mr. C. Horsley; four mechanical engineers; five medical men; several peers and Members of Parliament; a sprinkling of naval and military officers; a few literary men and journalists; many manufacturers and merchants; and a large number of barristers and solicitors. Only some six or seven members of the late Metropolitan Board of Works (out of twenty-eight or thirty who were candidates) have obtained seats on the Council. "Dod" will be as indispensable hereafter in this his new departure as he has hitherto been in the Parliamentary field. ——We have received a copy of the new edition of the "*Pall Mall Gazette Extra*, No. 47," which is entitled "The Popular Guide to the House of Commons, 1889, and to the London County Council, with 'Mems. about Members,' and 100 Portraits" (London: *Pall Mall Gazette* Office. Price 6d.). This is a marvellously cheap and handy reference-book, and contains a great deal of useful information. The portraits are not all of them "speaking likenesses," it is true, and the "Mems. about Members" are characteristically dished up with a greater amount of *sauce piquante* than will be agreeable to many palates. Nevertheless, the *Pall Mall* "House of Commons and County Council" will be found of great service by politicians and ratepayers of all parties.—— "The Trade of the United Kingdom," by Thomas J. Dymes, B.A. (London: Elliot Stock, 62, Paternoster-row. Price not stated), is a useful manual of instruction and reference, giving, as its title-page states, "a concise account of the sources and supplies of our chief imports and of the distribution of our chief exports, with an abstract of our trade with each country of the world, and of the trade of the chief ports of the United Kingdom," &c. According to the preface, it owes its birth to recent efforts in the direction of the improvement of "commercial education." A great portion of the book has been avowedly written and compiled for the use of students; but it contains a mass of well-digested and carefully-arranged statistics which will be found of much service for purposes of reference. The figures given are based in great part on the Board of Trade's "Annual Statement" for 1886 (that for 1887 not appearing until the book was approaching completion), and the average of the five years 1882-86 is taken. The author says that "notwithstanding the keen competition of our neighbours and the world generally, the natural growth of their own manufactures as they advance in wealth, and their efforts to import foreign commodities direct, and thereby to dispense with our services, it is satisfactory to note that the volume of our trade has again been steadily expanding during the last two years, and that England still remains the market of the world."—— "London in 1889," by Herbert Fry (London: W. H. Allen & Co., 13, Waterloo-place, S.W. Price 2s.) is this year's issue of an excellent guide-book to London, which we noticed at some length last year. It is illustrated by twenty bird's-eye views (serving as route-maps) of the principal streets, although the lettering on the cover disagrees with that on the title-page (and with the fact) in stating the number of these views to be only eighteen. There is also a useful general street-map of central London, and a map showing the relative positions of the suburbs and environs of the metropolis. We notice that several mistakes which we pointed out in last year's issue of the book have been corrected in the present issue, which we can heartily recommend to visitors to London. Indeed, many Londoners themselves, especially in view of the changes made during recent years, might derive much instruction from the work, which contains within a small compass a great deal of historical information interwoven with the topography. A further recommendation of the book is that it is well indexed.——"The Wedding Ring: its History, Literature, and the Superstitions Respecting It," by Joseph Maskell, A.K.C. (London: Simpkin, Marshall, & Co., Stationers' Hall-court. Price 2s.) is a well-got-up and entertaining little book (now in its second edition), presenting in a concise form the leading points in what may be called the archæology of a subject of very wide interest.——"Coach Trimming," by William Farr and George A. Thrupp (London: Chapman & Hall. Price not stated), is a useful illustrated handbook, issued by the sanction of the Coach and Coach-Harness Makers' Company of the City of London, and is one of a series of handbooks which have been produced at their instance for the instruction of workmen in the trade. It is tersely written, and admirably adapted to the end in view.——"Infection and Disinfection," by Robson Roose, M.D., F.C.S. (London: Chapman & Hall. Price not stated), consists of a useful reprint from the *Fortnightly Review*, with additions. The author very clearly discusses the various theories of infection, and adopts the view that infection is conveyed by means of micro-organisms. He also describes the best methods of disinfection, and, we are glad to see, points out that deodorisation and disinfection are not synonymous terms. Deodorisation may be effected, and may often lull people into a false sense of security, without actually destroying the *virus* of a disease. Unless this *virus* be completely destroyed there is no real disinfection. The pamphlet is one which may be read with profit by every householder. —— "Jarrolds' Norwich and Eastern Counties Handbook, 1889" (Norwich: Jarrold & Sons. Price 6d.), is a very useful handbook for Norwich and neighbourhood, and it includes a clerical directory for Norfolk and Suffolk. It gives particulars of all the various public bodies, societies, and institutions of Norwich, but it contains no list of the local banks,—an omission which should be supplied in future editions. ——"Shelley & Co.'s Complete Press Directory for 1889" (London: Shelley & Co., 5, Leaden-

hall-street. Price 1s.) is the third edition of a very useful work of reference. A good feature in it is its summary of "Leading Newspaper Law Cases" for the year 1888.——A bulkier and larger work of the same kind is "The Advertisers' A.B.C." (London: T. B. Browne & Co., 163, Queen Victoria-street, E.C. Price 10s. 6d.). This work forms a very complete directory to the London and Provincial newspapers, magazines, reviews, &c., and to the chief colonial and foreign papers. It is very copiously indexed.——"Sell's Directory of Registered Telegraphic Addresses" (London: Sell's Advertising Agency, 167, Fleet-street. Price 5s.) is now in its fifth year. It has been completely revised, and now contains more than 30,000 of the best names in the mercantile world, with their registered telegraphic addresses. It consists of three main sections,—(1) names of firms alphabetically arranged, (2) telegraphic addresses alphabetically arranged, and (3) Sell's telegraphic code, which will be found useful. The Post Office authorities, we see, still refuse to give any assistance to the compilers of the work.——"Street's Indian and Colonial Mercantile Directory for 1888-9" (London: Street & Co., 30, Cornhill. Price 25s.) is the twelfth issue of that now indispensable work. It is admirably arranged and produced, and is increasing in size and value with each issue. We have on former occasions spoken in terms of high commendation of the volume, which is fast approaching in bulk the London Post Office Directory. It contains several excellent maps, and a fund of official and commercial information as to India and all our colonies and dependencies, with statistics of population, imports and exports, &c. Each important city or town has its own separate official and commercial directory.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

7,165, Window Sashes, Frames, and Fittings. G. H. Couch.

The sashes which are the subject of this invention are hung each counterbalancing the other, and the frame of the sash is made removable, and with special arrangements for excluding moisture. The sashes are also interchangeable and removable for purposes of cleaning, &c.

7,327, Bricks and Building Blocks. H. G. Carew and F. B. Potts.

The brick or building block which is the subject of this patent is made of clay, terra-cotta, porcelain, stone, or iron, of somewhat similar shape to those in general use, but pierced in one or more places and the cavities charged with charcoal in the form of cubes. These cubes are removable, and they may be replaced with fresh charcoal, without disturbing the bricks or blocks.

8,355, Improved Flue-cap. J. B. Cohén.

In order to prevent down-draught and to increase up-draught, an apparatus is, by this invention, fixed on the outlet of the flue,—a case of metal or terra-cotta, with the sides, ends, and top furnished with openings partially closed by fixed or movable louvres (which are disposed so as to deflect the air striking against them, always in an upward direction, thus preventing the possibility of down-draught). Other louvres deflect the currents horizontally, and the diverging currents produce a partial vacuum and the smoke is drawn up.

12,225, Safety Contrivance for Use in Cleaning Windows. K. Bernhard.

This invention consists of a device to prevent persons falling out when cleaning windows. It consists of tubular folding-bars, and is arranged so that it can be folded up or fitted very quickly. Angle pieces are provided with means for fastening the whole apparatus to the ledge or sill of window.

15,725, Cowls or Ventilators. S. Worsencroft.

The body of the cowl or ventilator which is the subject of this patent is of a cylindrical or slightly conical form, and is provided with a number of short air tubes or passages of a smaller diameter, and preferably of a flattened rectangular section. These tubes are open at the top and bottom, and pass through the cylindrical or conical body of the cowl in an inclined direction, so that their outer and lower ends are exposed to the atmosphere outside the body, and their inner and upper ends meet at about the centre of the inside. They are arranged alternately in pairs, each pair meeting in the interior at an angle of about 30 deg., and an ascending induced current of air is thus created up the centre of the cowl or ventilator, and all down-draughts are effectually prevented.

2,632, Artificial Building Materials. J. Sugden.

According to this specification, a material suitable for cornices, linings for passages, partitions, roof-coverings, &c., for building, which is capable of being slightly bent and of having nails or screws driven into it without breaking or cracking, and of being sawn with an ordinary saw, is produced by mixing sawdust and plaster of Paris, &c., and spreading it upon jute such as is used for packing. The substance is built up with alternate layers of the plaster and jute.

2,890, Window-fasteners. G. Robinson and H. James.

The window-fastener which is the subject of this patent is of the ordinary screw-in type, but with this difference, that two short metal tubes revolve one within the other, and a system of letters or signs allow only the window to be unfastened when they are in juxtaposition. The system, therefore, must be known to the person operating the fastener. The windows cannot be opened by any unauthorised person.

NEW APPLICATIONS FOR PATENTS.

April 8.—5,952, E. Allen, Construction of Dwellings for the Poor.—5,959, R. Horne, Automatic Window-fastener and Ventilator. — 5,967, C. Gardiner, Fence for Planes.—5,989, T. Graham, Device for Fanlights, &c.—5,999, W. Jennings, Nails.—6,009, A. Mantle, Kitchen-ranges.—6,018, R. Haddan, Belt or Binding for Paint-brushes.

April 9.—6,037, S. Grimshaw, Opener for Windows, Ventilators, &c.—6,054, R. Wilding, Ventilation of Water-closet Basins.—6,101, T. Dault, Casement Windows and Doors.

April 10.—6,123, W. Ramsbottom, Flushing Water-closet Basins.—6,152, W. Williams, Ventilator for Buildings.—6,155, W. Charlton, Double Hinges.—6,157, T. Prentice, Raising and Lowering Window-sashes.—6,166, H. Adeane, Fixing Sash-lines to Sashes.

April 11.—6,177, J. and B. Taylor, Preventing the Slipping of Ladders, &c.—6,179, J. Simpson, Raising, Lowering, and Sustaining Window-sashes.—6,183, L. Friedrich, Tombstones, Memorial Tablets, &c.—6,187, J. Hardy and F. Saunders, Steps consisting of Iron Frames and Tesselated Tiles.

April 12.—6,246, J. Howie, Syphon Cisterns for Flushing Water-closets, &c.—6,261, F. Meriton, Chimney-pot. — 6,293, D. Hildersley, Flushing Cisterns for Water-closets, &c. — 6,305, J. Coulthurst, Sanitary Socket-pipes, &c.—6,310, J. Gibson, Tombstones, Monuments, and Statuary.—6,348, J. Wolf, Plastic Fire and Weather Proof Wood Mass. — 6,373, F. Schmaltz, Saw-sharpening Machines.—6,380, E. Edwards, Roof Ventilators.—6,382, F. Bartlett, Heating and Ventilating.—6,389, Sir E. Harland and C. Gray, Elastic Tile Floorings, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

512, J. McPlinn, Mortising-machine.—2,408, H. Lake, Ornamenting in Relief Walls, &c.—2,962, P. & E. Brannon, Construction of Buildings, &c., of Cement, Concrete, &c.—3,339, J. Groom, Heating Buildings, &c., by Hot Air.—3,354, A. Ponton and others, Blocks or Bricks.—3,729, H. Mansfield, Attachment for Pointing Trowels.—3,763, W. Mitchell and W. Hare, Chimney Cowl or Pot.—3,833, T. Kemp, Testing House-drains.—4,009, W. Henderson, Fastening Window-sashes.—4,220, W. Smith, Sewer and House-drain Traps.—4,501, R. Harnett, Ventilator.—4,641, W. Nightingale and others, Cement.—4,650, W. Hes, Compositions for Decorative Purposes.—4,817, C. Cole, Band-saw Setting Machine.—4,895, J. Marks, Catches or Fasteners for Doors.—5,068, R. Blyth, Automatic Sash-fastener.—5,073, G. Wallis, Ventilating and Flushing Sewers.—5,083, W. Dunn, Water-closets.—5,163, T. Hilton, Flushing Syphon.—5,188, F. Newman, Sash-fasteners.—5,245, B. Pitt, Window-sash-fasteners.—5,260, A. Carpenter, Fasteners for Window-sashes.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

6,707, T. Craddock, Stoves or Kitcheners.—7,295, W. Russell, Stoves and Fireplaces.—7,419, W. Stone and H. Turner, Cisterns, &c.—7,962, T. Stead, Metallic Screen for Theatres, &c.—8,391, J. Craig, Flush-out Water-closet Basins.—8,630, P. Clark, Kitchen-ranges.—9,163, T. Twyford, Water-closets.—1,363, J. Clayton and C. Tindall, Water-closets.—1,422, T. Oakley and E. Smith, Ventilation of Buildings, &c.—2,857, W. Meister, Planes.—4,076, J. Taylor, Self-closing Doors.—4,286, J. Winskill, jun., Kiln for Burning Limestone.—4,326, J. Fryer, Extracting Cowl or Ventilator.—4,395, B. Busse, Ventilating Buildings.

Appointment.—Mr. W. Stringfellow, assistant in the office of the Borough Surveyor of Southampton, has been promoted to the post of Assistant Borough Surveyor, vice Mr. Weston resigned.

Professor Corfield, M.D., has been elected a Corresponding Member of the Italian Association "Dei Benemeriti," and awarded a gold medal for his contributions to hygiene.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

APRIL 15.—By MADDOX & SON.

Oxford-st., James-st.—F.g.r. £45, with reversion in 14 yrs. to e.r. of £110 p.a.	£1,410

By G. A. WILKINSON.

Isleworth — Freehold house and 3a. 3r. 34p., r. £75 p.a.	2,010
Russell-sq. — 34, Woburn-pl., u.t. 31 yrs., g.r. £16. 16s., r. £100 p.a.	850
Wandsworth—7, Granville-rd., f., r. £30 p.a.	360

By J. C. PLATT.

Acton—F.g.r. of £18. 1s., reversion in 79 yrs. to £141. 14s. p.a.	375

By COLLINS & COLLINS.

Hornsey—20, 22, 24, and 26, Sunnyside-rd., f., r. £138 p.a.	1,600

APRIL 16.—By G. HEAD & CO.

Upper Baker-st.—No. 13, u.t. 33 yrs., g.r. £35, r. £120 p.a.	900

By RUTLEY, SON, & VINE.

Hampstead-rd.—7, Rutland-st., u.t. 35 yrs., g.r. £8. 8s., r. £55	485
Euston-rd.—26 and 27, Thanet-st., u.t. 17 yrs., g.r. £14, r. £68 p.a.	295

By EASTMAN BROS.

St. George's, E.—6 to 11, Ellen-pl., u.t. 9 yrs., g.r. £12, e.r. 156 p.a.	255

By PRICKETT, VENABLES, & CO.

Hadley—Residence, Hadley Cote, f., r. £50 p.a.	650
171 and 173, High-st., f., r. £32. 10s. p.a.	480
Freehold residence, r. £25 p.a.	405
Freehold blacksmith's shop, r. £10 p.a.	185
The Limes, f., r. £120 p.a.	1,730
1 and 2, Clyde-villas, f., r. £95 p.a.	1,525
Barnet—226 and 228, High-st., f., r. £51 p.a.	885
201 and 203, High-st., f., r. £82 p.a.	1,405
75 and 77, High-st., The Armoury, f., r. £85 p.a.	1,200
Union-st.—L.g.r. of £5, term 53 yrs.	120
Plot of freehold land, r. £2 10s. p.a.	200
106, High-st., f. and c., r. £45 p.a.	1,210
96, High-st., f., r. £50 p.a.	1,050
F. house and shop, e.r. £20 p.a.	300

APRIL 17.—By WESTON & SON

Brixton—174, 176, and 180, Ferndale-rd., u.t. 75 yrs., g.r. £15, r. £106 p.a.	835
1, 2, and 5, Bythorn-st., u.t. 75 yrs., g.r. £6, r. £109 p.a.	710
6 and 10, Bythorn-st., u.t. 75 yrs., g.r. £10, r. £72. 16s. p.a.	440
2 to 8 (even), and 11, 13, and 16, Glendall-st., u.t. 75 yrs., g.r. £3. 10s., r. £259 p.a.	1,920
6 and 8, Shannon-gr., u.t. 78 yrs., g.r. £6, r. £59. 16s. p.a.	450
Battersea—31, Wilson-st., u.t. 63 yrs., g.r. £6. 10s., r. £19. 10s. p.a.	55

By S. PEARCE & SONS.

Holloway—9, Hollingsworth-st., u.t. 55 yrs, g.r. £6, r. £34 p.a.	275
Stoke Newington—109, Winston-rd., u.t. 71 yrs., g.r. £5, r. £30 p.a.	275

By HOBSON, RICHARDS, & CO.

Wandsworth—F.g.r. £6, reversion in 92 yrs. to £30 p.a.	126

By WALKER & RUNTZ.

Old Ford—38 to 48 (even), Armagh-rd., u.t. 71 yrs., g.r. £18. 18s., r. £156 p.a.	900
58 to 62 (even), Armagh-rd., u.t. 70 yrs., g.r. £12. 12s., r. £104 p.a.	800
Kingsland-rd.—No. 448, f., r. £70 p.a.	1,050
Chadwell Heath—Plot of f. land	90

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

HEALTH CONGRESS AT HASTINGS.

WE have received the prospectus of the Health Congress to be held in the Royal Concert Hall, Warrior-square, St. Leonards-on-Sea, next week, from April 30 to May 4, under the presidency of Dr. B. W. Richardson, F.R.S.

The Domestic and Sanitary Exhibition, held in connexion with the Congress in the Central Recreation Ground, Hastings, will be opened on Monday next, April 29, at 2.30 p.m.

The Congress will commence on Tuesday evening, April 30, at 8 o'clock, when the opening address will be delivered in the Royal Concert Hall, by the President, Dr. Richardson.

On Wednesday, May 1, section A of the Congress, devoted to "Sanitary Legislation" (including legislative measures for the public health at home and abroad), will be opened at 10 a.m., when the President of the Section, Mr. Wilson Noble, M.P., will deliver his address. This will be followed by papers and discussions on various subjects, including one on "The Census," by Sir Edwin Chadwick.

On Thursday, May 2, Section B, devoted to "Health of Towns, Municipal Sanitation," will be opened, under the presidency of Major-General Webber, R.E., who will deliver an address. Papers and discussions will follow, including one on "The Disposal of the Dead," by Dr. E. Haward.

On Friday, May 3, Section C, devoted to "Domestic Health" (including educational training), will meet, under the presidency of Dr. Frederick Bagshawe. After the President's address there will be papers and discussions.

On Saturday, May 4, at 8 p.m., Dr. Richardson will deliver an address to the working classes, illustrated by the oxy-hydrogen lantern.

MEETINGS.

SATURDAY, APRIL 27.

Architectural Association.—Visit to New R.C. Church, Spanish-place. Messrs. Goldie, Child, & Goldie, architects.

MONDAY, APRIL 29.

Surveyors' Institution.—8 p.m.

Leeds and Yorkshire Architectural Society.—(1) Secretary's Report. (2) Election of Officers. 7.30 p.m.

TUESDAY, APRIL 30.

Architectural Association.—Members' Soirée.

Institution of Civil Engineers.—(1) Further Discussion on Sir Nathaniel Barnaby's paper on "Armour for Ships." (2) Mr. W. H. Greenwood on "The Treatment of Steel by Hydraulic Pressure." 8 p.m.

Society of Antiquaries.—Anniversary. 2 p.m.

Society of Arts (Foreign and Colonial Section).—Captain Wiggins on "The Northern Waterway to Siberia." 8 p.m.

Royal Institution.—Dr. Jean Paul Richter on "The Italian Renaissance Painters." I. 3 p.m.

Glasgow Architectural Association.—Social Meeting and Annual Exhibition of Members' Drawings.

WEDNESDAY, MAY 1.

Institution of Mechanical Engineers.—Ordinary General Meeting. The President (Mr. Charles Cochrane) will deliver his inaugural address. 7.30 p.m.

Society of Arts.—Mr. W. H. Preece, F.R.S., on "Secondary Batteries." 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.

THURSDAY, MAY 2.

Royal Institution.—Mr. E. Muybridge on "The Science of Animal Locomotion in its Relation to Design in Art." I. 3 p.m.

Royal Archæological Institute.—Mr. J. Lewis André on "Ritual Ecclesiology in East Norfolk." 4 p.m.

Institution of Mechanical Engineers.—Ordinary General meeting (continued). 7.30 p.m.

Sanitary Institute.—Mr. B. Anningson, on "Rural Epidemics." 5 p.m.

Edinburgh Architectural Association.—Mr. J. Gordon, on "Carving." 8 p.m.

FRIDAY, MAY 3.

Architectural Association.—(1) Nomination of Officers for the ensuing Session. (2) Mr. J. Starkie Gardner on "Ecclesiastical Wrought Iron Door Furniture." 7.30 p.m.

Royal Institution.—Sir Henry Roscoe, M.P., F.R.S., on "Aluminium." 9 p.m.

Institution of Mechanical Engineers.—Ordinary General meeting (continued). 2.30 p.m.

SATURDAY, MAY 4.

Association of Municipal and Sanitary Engineers and Surveyors.—Home Counties' District Meeting at Southampton.

Association of Public Sanitary Inspectors.—Annual address by the President (Sir Edwin Chadwick).

Miscellanea.

Wood-Block Flooring.—We have received from Mr. Roger L. Lowe, of the Britannia Works, Farnworth, near Bolton, a copy of his new catalogue or hand-book of wood-block flooring, which has now been very largely used, and with great satisfaction to the numerous architects who have specified it, as is apparent from the long array of testimonials which Mr. Lowe prints. We have on a former occasion spoken in high terms of the merits of Mr. Lowe's system of wood-block flooring. For churches, schools, and other buildings this flooring is especially well adapted, inasmuch as it is dry, durable, firm, comparatively noiseless, and offers no space for the harbouring of mice or beetles. The preservative composition by which each block is cemented to the concrete foundation is an important feature of Mr. Lowe's method of laying wood-block floors.

Glasgow Archæological Society.—The monthly meeting of the Glasgow Archæological Society took place on the 18th inst., in the Philosophical Society's Rooms, Bath-street, Dr. Jolly presiding. The first paper read was one on "The Incised Bulls of Burghead, and their Supposed Connexion with Mithraism," by Dr. James Macdonald, after which a communication on "Egyptian Scarabs—their Meaning and their Lessons," by Mr. J. Macnaught Campbell, was read by Mr. Govan Greenless. A stone axe, found at Clober, Milngavie, was exhibited by Mr. A. N. Bertram.

Royal Academy: Architectural School. The class for Architectural Modelling has terminated for the session, and a series of demonstrations will be given by Mr. Stannus, on architectural foliage, from six to eight, on Monday and Thursday evenings, as follows:—*Analysis.*—I. The Leaf, April 29; II. The Stem, May 6; III. Beginnings and Ends, May 13. *Historical Development.*—IV. Egyptian, Assyrian, Greek, May 20; V. Roman, Byzantine, Arabic, May 23; VI. Romanesque, Gothic, May 27; VII. Italian and French Renaissance, May 30; VIII. German, Flemish, and English Renaissance, June 3.

Association of Municipal and Sanitary Engineers and Surveyors.—A Home Counties' District Meeting of this Association is to be held at Southampton, on Saturday next, May 4.

Overcrowding in Newcastle-on-Tyne.—The *Newcastle Chronicle* of the 20th inst. contains an article on the overcrowding caused in that city amongst the poor people dispossessed of their houses by the operations of railway companies. The *Chronicle* says that "the space in front of the Forth goods station is now an open one, and all the old houses, with certain remains of the Town Wall, from Forth Banks to Hanover-square, have been pulled down. The Back-row and Bailiffgate are gone, and stretching across the ground where those thoroughfares used to be are immense brick arches and foundations, strongly faced with stone, upon which the new lines of the railway company will in course of time be placed. Nearer the High Level Bridge workmen are widening the railway approach from the Central Station to the bridge. Hundreds of houses of the working-class and poorer class type have disappeared to make way for the work now in progress, and the change in the aspect of the locality is certainly one of the most remarkable kind. While the railway improvements have led to wholesale displacement in the Westgate direction, it must be admitted that the condition of the working-class and of the still humbler classes of townspeople has not been improved.

The Chinese and Light and Air.—We laugh sometimes at the civilisation of the Chinese, but they could teach us a lesson in a useful art. In his description of one of the cities on the Yang-tse, Mr. Little observes:—"Were such an outrage as the Queen Anne Mansions are to London to be contemplated here, the Dragon and the Tortoise, in the shape of an infuriated mob, would rise from their sleep of ages to overthrow the ill-omened erection." But in China the rules of geomancy, or Feng-shui, the science of wind and water, would make such buildings impossible. To injure the community and affront the *genus loci* by intercepting the kindly influences of Nature is a crime in China. Mr. Justice Kekewich had to give a decision the other day as to the Feng-shui of the hideous structure which the Queen Anne and Garden Mansions Company proposed to rear to the skies; and, fortunately for the artistic sense of coming generations, the decision is against the company. An injunction has been issued restraining the defendants from carrying out their project in the way intended. The Guards' Memorial Chapel is, therefore, not to be deprived of light, and the horizon is not to be made more unsightly than it is already.—*St. James's Gazette.*

Peterborough Brick Trade.—We hear that this trade, from the brickfields adjoining the Great Northern Railway Co., Fletton Siding, is increasing in a most surprising manner. The demand for the pressed bricks for some time past being large and constant, the makers have more than once raised the price, but still the orders continue coming in. Something like 150,000 bricks are now being sent away daily, and there is believed to be every probability of even this large number being considerably increased in the immediate future. The Great Northern Railway Company for some time past have been in the habit of sending one special engine daily to take the bricks from the siding to the Peterborough goods yard, but the number of bricks sent away has so very much increased that they are now compelled to send daily two special engines for this purpose.

Spanish Exhibition in London.—It is announced that the Spanish Exhibition, to be held in the building and grounds at Earl's-court, West Brompton, which were used for the Italian Exhibition last year, and for the American Exhibition two years ago, will be opened in May. The *City Press* says that Mr. Ernest A. E. Woodrow, A.R.I.B.A., assistant architect of the American and Italian Exhibitions, has been appointed architect of the Spanish Exhibition.

Further Stringency of Building Laws in Sweden.—In addition to the recently-enacted stringent building laws in Sweden, chronicled in our columns, a further order has been issued by the Building Board of Sweden to the effect that any builder who undertakes the erection of a house of stone above one story in height without being qualified by certain Swedish institutes named in the order, is liable to criminal prosecution.

The Garrick Theatre.—This theatre was opened a day or two ago. It was described and illustrated (with view, plan, and section) in the *Builder* for June 30, 1888. Mr. Walter Emden is the architect.

A Discovery at Naples.—The Naples correspondent of the *Daily News* writes:—"While some repairs were lately being made under a house belonging to Baron di Donato, which is situated in the northern quarter of the city, towards the slope of the hill of Capo di Monte, where already many ancient catacombs have been found, a doorway (over which there is a marble relief of the head of Medusa) was discovered, leading into a subterranean chamber. Along the centre of this chamber runs a mosaic pavement, and on each side there is a double row of sepulchres hewn in the rock, the fronts of which are stuccoed and painted, and decorated with terra-cotta and marble reliefs. Within the tombs were perfect skeletons, vases, and other objects; the antique lamps being in such good condition that yesterday, April 18, when this new find was inspected by a party of German archæologists, the workmen made use of them to light up the vaults. The many well-preserved inscriptions are chiefly in Greek, with some in Latin, and prove that the epoch of these tombs was about 1,000 B.C. Other tombs in a second chamber have not yet been excavated. It is probable that this subterranean dwelling of the dead may extend some distance, and prove to be a portion of a large necropolis."

The English Iron Trade.—The English iron market has been rather quiet on the whole during the week, but this quietness must be attributed more to the intervention of the holidays than to any falling-off in trade. There are indications that a very busy season is before us, the present tone of the market being one of great firmness, with a rising tendency. Pig-iron has been sold at full rates, and even at an advance. Scotch warrants, as well as prices quoted for makers' iron, have been improving. Cleveland pig is quite 6d. a ton higher, and Bessemer iron has increased 1s. in value. Manufactured iron continues in full demand, and prices are very strong. Sheets are quoted 2s. 6d. and 5s. a ton more. The tin-plate trade is active, and buyers show more inclination to place orders. There are large numbers of contracts for steel in the markets, notably for rails, but more particularly for shipbuilding material. Steel blooms, billets, and slabs are quoted 2s. 6d. a ton more. Shipbuilders, who are working busily, and are launching a large tonnage, are still in the receipt of fresh orders. Engineers are fully employed, and will continue so for some time to come.—*Iron.*

The Late M. Chevreuil.—The *Illustrated London News* of Saturday last publishes what is stated to be a very good portrait of the late M. Chevreuil, the distinguished French *savant*,—distinguished not only for his work as a scientist, but for the great age which he attained. He was born at Angers on August 31, 1786,—three years before the Revolution, and he died on the 9th inst., in his 103rd year. So far back as 1813 he was appointed Professor of Chemistry at the Lycée Charlemagne. He became Director of the Dyeing Department, and Professor of that special branch of chemistry at the Gobelins Tapestry Factory. His fame as a man of science was enhanced by his original investigations of the chemical conditions determining the production of colours. He was a copious writer, one of his treatises being on colours and their applications in the industrial arts. He is stated to have preserved his mental faculties unimpaired to the last.

Obituary.—We regret to announce the death of Mr. George Livermore Shorland (late of Manchester), which took place at his residence, The Laurels, High Barnet, near London, on the 22nd inst. The remains were conveyed to Manchester, and were interred at the Manchester Southern Cemetery on the 25th inst., the coffin being borne to the grave by workmen in the employ of Mr. E. H. Shorland (late Shillito & Shorland. Mr. G. L. Shorland was well known in connexion with warming and ventilating, and was the patentee of the well-known Manchester Grate and Manchester Stove. Since his health failed him, he ceased to take an active part in the business of manufacturing his patented appliances, which has, therefore, been conducted by his son, Mr. E. H. Shorland.

Well at Harlington.—With reference to the paragraph on p. 304 of our last issue as to the artesian well at Harlington, we are asked to say that the well was bored for the Metropolitan Police, under the direction of Mr. John Butler, Surveyor to the Metropolitan Police, *not* the Office of Works.

The Art-Union of London.—The general meeting for the distribution of prizes will be held at the Adelphi Theatre, on Tuesday, May 7.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	10	0
Teak, E.I.....load	11	0	0	15	0	0
Sequoia, U.S.....foot cube	0	2	3	0	3	0
Ash, Canada.....load	3	10	0	5	0	0
Birch ,, ...	3	10	0	6	0	0
Elm ,, ...	4	0	0	5	0	0
Fir, Dantsic, &c.	2	0	0	3	10	0
Oak ,, ...	2	10	0	4	10	0
Canada	5	10	0	7	10	0
Pine, Canada red	3	5	0	4	0	0
,, yellow	3	10	0	5	10	0
Lath, Dantsic.....fathom	4	10	0	5	10	0
St. Petersburg.....	5	0	0	6	10	0
Wainscot, Riga, &c.....log	2	15	0	4	5	0
Odessa, crown.....	0	0	0	0	0	0
Deals, Finland, 2nd and 1st...std.100	9	10	0	11	0	0
,, ,, 4th and 3rd.....	8	0	0	9	0	0
Riga	7	10	0	9	0	0
St. Petersburg, 1st yellow	11	0	0	15	0	0
,, 2nd ,, ...	10	0	0	11	0	0
,, white	7	10	0	10	10	0
Swedish	9	0	0	16	0	0
White Sea	9	10	0	17	0	0
Canada, Pine, 1st	16	0	0	28	10	0
,, ,, 2nd	11	0	0	17	10	0
,, ,, 3rd, &c.	8	0	0	10	10	0
,, Spruce, 1st	9	10	0	11	0	0
,, ,, 3rd and 2nd	7	10	0	9	0	0
New Brunswick, &c.	6	15	0	8	15	0
Battens, all kinds	6	10	0	20	0	0
Flooring Boards, sq., 1 in., prepared, First	0	11	0	0	14	6
Second	0	8	0	0	10	9
Other qualities	0	5	6	0	7	9
Cedar, Cuba.....foot	0	0	4½	0	0	4½
Honduras, &c.....	0	0	4	0	0	4½
Mahogany, Cuba	0	0	4½	0	0	6½
St. Domingo, cargo average	0	0	4½	0	0	6½
Mexican ,, ...	0	0	4½	0	0	5½
Tobasco ,, ...	0	0	5½	0	0	6½
Honduras ,, ...	0	0	5½	0	0	6½

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Box, Turkey .....ton	4	0	0	12	0	0
Rose, Rio	15	0	0	20	0	0
Bahia	14	0	0	18	0	0
Satin, St. Domingo .....foot	0	0	6	0	1	0
Porto Rico	0	0	9	0	1	3
Walnut, Italian	0	0	4½	0	0	6½
METALS.						
Iron—Bar, Welsh, in London...ton	5	5	0	5	10	0
,, ,, at works in Wales ...	4	15	0	5	0	0
,, Staffordshire, in London ...	5	10	0	6	10	0
Copper—						
British, cake and ingot..... ton	44	0	0	45	0	0
Best selected	46	0	0	0	0	0
Sheets, strong	51	0	0	52	0	0
Australian	0	0	0	0	0	0
Chili, bars	37	10	0	0	0	0
Yellow Metal.....lb.	0	0	5½	0	0	5½
Sheet, English.....	13	10	0	14	0	0
Spelter—						
Silesian, special .....ton	17	10	0	17	12	6
Ordinary brands.....	17	7	6	17	10	0
Tin—						
Banca .....ton	94	0	0	0	0	0
Billiton.....	93	0	0	0	0	0
Straits	92	0	0	0	0	0
Australian	93	0	0	0	0	0
English Ingots.....	95	0	0	0	0	0
Zinc—English sheet .....ton	21	0	0	22	0	0
OILS.						
Linseed .....ton	18	10	0	18	15	0
Cocoanut, Cochin	27	0	0	23	0	0
Ceylon	25	10	0	0	0	0
Palm, Lagos	24	10	0	25	0	0
Rapeseed, English pale	27	10	0	0	0	0
,, brown	25	10	0	0	0	0
Cottonseed, refined	24	5	0	25	5	0
Tallow and Oleine	19	0	0	45	0	0
Lubricating, U.S.	5	0	0	6	0	0
,, refined	7	0	0	12	0	0
Tar—Stockholm .....barrel	1	2	9	1	3	0
Archangel	0	14	9	0	15	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Removal of Road Sweepings & Street Watering	Hackney Bd. of Works	J. Lovegrove.....	April 30th	ii.
Broken Granite	Gravesend U. S. A.....	*Official*	May 4th	ii.
Engine Shed, Tunbridge Wells	L. B. & S. C. Ry. Co....	C. H. Gough.....	May 6th	x.
Thames Ballast, Sand, and Cement	Paddington Vestry	*Official*	do.	x.
Wood Paving Blocks	do.	do.	do.	x.
New Sorting Office, Acton.....	Com. of H.M. Works..	do.	May 7th	x.
Various Cleansing, &c., Works.....	Poplar & Stepney Sick Asylum District	A. & C. Harston	do.	ii.
Additions, &c , to Town Hall	Leyton Local Board.....	W. Dawson	do.	x.
Yellow Deal and Batten Ends	Eton Union	*Official*	do.	ii.
Roadmaking and Paving Works.....	Hammersmith Vestry...	H. Mair	May 8th	x.
Greenhouse.....	Borough of Salford	.....	May 9th	ii.
Covered Seats.....	Brighton Town Council	G. R. Andrews.....	do.	ii.
Glazed Stoneware Pipe Sewers, Manholes, &c.	Barking Town Loc. Bd.	Brundell & Dawson.....	do.	x.
Surface-water Drainage Works, Penge	Lewisham Bd. of Wks.	*Official*	do.	x.
Road Materials	do.	do.	do.	x.
Masonry, Brickwork, &c., Tower Bridge	Corporation of London	J. Wolfe Barry	May 10th	ii.
Roadmaking and Paving Works	Willesden Local Board	O. Claude Robson.....	May 14th	x.
Alterations in Station Buildings, &c.	Great Western Ry. Co.	*Official*	do.	ii.
Wood-paved Carriageway, Stone Footways, &c.	London County Council	do.	do.	x.
Broken Granite.....	West Ham Council.....	L. Angell	do.	xi.
Tarpaving and Roadmaking Works, &c.....	Fulham Vestry.....	J. P. Norrington.....	May 15th	x.
Pipe Sewers, Manholes, Gullies, &c.	do.	do.	do.	x.
Sewerage Works	Richmond Union	F. Wentworth-Shields	May 20th	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Superintendent of Sewerage and Outfall Wks.	Finchley Local Board...	2*l.*	April 29th	xvi.
Building Inspector	Sheffield Highway Com.	130*l.*	May 8th	xvi.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

CHESHAM (Bucks).—For erecting shoe factory and houses at Chesham, Bucks, for Messrs. J. & G. Barnes. Mr. W. H. Syme, architect, Watford :—

Bates, Charleywood	£3,027 0 0
Kingerlee, Oxford	2,919 0 0
Turner, Watford	2,795 0 0
Waterman, Watford	2,717 0 0
Honour, Tring	2,577 10 0
Harding, Chesham	2,510 0 0
Mead, Chesham (accepted)	2,195 0 0

CROYDON.—For sundry repairs at 72, Wellesley-road, Croydon, for Mr. C. Rigby. Mr. Francis A. R. Willey, architect, 66, Ludgate-hill, E.C. :—

Rowe, Clapham-road	£108 0 0
T. Barton, Croydon	73 0 0
A. Ackworth, South Norwood	65 0 0
A. Lincoln, 237, Cornwall-road, W.*...	60 0 0

* Accepted.

DARTFORD.—For erecting Almshouses for the Trustees. Mr. John Johnson, A.R.I.B.A., architect, 9, Queen Victoria-street, E.C. :—

Stimpson	£1,510
Dove Bros.	1,455
Archer	1,410
Falkner	1,385
Wallis.....	1,375
Knight	1,360
King Bros. & Co., South Norwood*	1,290

* Accepted

EALING.—For sundry works to be executed at Warden Villa, Uxbridge-road, Ealing, including the erection of a billiard room at the rear, for the Ealing Constitutional Club Company. Mr. Robert Willey, architect, 66, Ludgate-hill, London, E.C. :—

Groves.....	£962 10 0
Myring	825 0 0
Spackman	811 0 0
Adamson & Son	810 0 0
Jones	790 0 0
Down (accepted)	645 0 0

[All of Ealing.]

GREAT STANMORE.—For additions and alterations to The Warren, Great Stanmore, Middlesex, for Mr. Charles Keyser. Mr. W. H. Syme, architect, Watford :—

Messrs. Kirby & Sons, Great Stanmore (approximate)	£1,000 0 0

GREENWICH.—For additions and alterations at the Fire Brigade station, Greenwich, for the London County Council :—

C. Robson	£317 12 0
Stimpson & Co.	310 0 0
H. J. Stephens.....	300 0 0
F. P. Smith	297 0 0
Gerrans	284 10 0
Holloway	274 0 0
W. & E. Mills	270 0 0

ISLEWORTH.—For the erection of a pair of semi-detached villas, on the Spring Grove Estate. Mr. Frederic W. Fryer, architect, 51, Cannon-street, E.C. :—

Arthur Porter, Tottenham	£880 0 0

[No competition.]

HALIFAX.—Accepted for erecting five middle-class houses, Heath-avenue, Halifax. Mr. T. Lister Patchett, architect, Halifax. Quantities by architect :—

Mason and Bricklayer.

Thos. Mitchell, Warley, near Halifax	£1,370 0 0

Carpenters and Joiners.

A. E. Anthony & Bros., Eastwood ...	593 0 0

Plumbers and Glaziers.

Jonas Alderson & Sons, Luddendenfoot	190 0 0

Slater and Plasterer.

John Robinson, Luddendenfoot	280 0 0

N.B.—Fencing, laying out grounds, fixtures, gas-fittings, and painting, not let.

LONDON.—For the repair of a portion of the pitching in Caledonian-road, for the Vestry of St. Mary, Islington. Mr. J. P. Barber, C.E., surveyor :—

P. Aspinall & Son	£4,380 14 9
G. Rutty.....	3,427 0 0
Mowlem & Co.	3,077 14 6
J. Biggs	3,061 13 6
Wm. Griffiths (accepted)	2,752 11 9

LONDON.—For erecting factory, dwelling-houses, &c., Queen's-road, Battersea, S.W., for Messrs. Bloomfield Bros. & Co. Mr. Hugh J. Curley, architect. Quantities by Mr. Thos. Massa :—

	Factories. £	Fittings. £	Houses. £	Yards. £	Total. £
Patman & Fotheringham	6,034	569	1,120	220	7,943
G. Stephenson ...	6,005	548	1,113	252	7,881
Prestage & Co.....	5,842	539	1,043	242	7,647
Kirk & Randall ...	5,755	525	960	203	7,443
Coulson Bros.....	5,678	513	913	285	7,369
W. Downes.....	5,615	552	964	216	7,347
W. & H. Castle ...	5,590	557	940	220	7,307
H. L. Holloway*..	5,500	530	953	210	7,193

* Accepted.

LONDON.—For the erection of two houses, stables, coachhouses, and workshops over, for Mr. J. Garner, Mansford-street, Bethnal-green, E. Mr. J. G. Needham, architect :—

Lusk.....	£1,594 0 0
Walker	1,520 0 0
Burgess	1,479 0 0
Colsell Bros.	1,364 0 0
Ivory	1,225 0 0
Winkley (accepted).....	925 0 0

LONDON.—For alterations and additions to the "Blue Anchor" tavern, York-street, Westminster, for Mr. Charles S. Pinn. Mr. John Cox Dear, architect, 150, Southampton-row :—

Burman	£1,469 0 0
Spencer & Co.....	1,420 0 0
Tyerman	1,360 0 0
Sharp	1,300 0 0
Lascelles	1,298 0 0
Drew & Co.....	1,271 0 0
J. Chapell	1,266 0 0
J. Beale	1,207 0 0

LONDON.—For proposed decorations, &c., to the "Castle" public-house, No. 28, Castle-street, Regent-street, for Mr. James Henderson. Messrs. Bird & Walters, architects :—

F Marks	£403 0 0
Langridge & Sons	401 12 4
J. Vears & Co.....	319 0 0
Hewett	287 0 0

LONDON.—For alterations, repairs, and decorations to the "Bedford Head," Covent-garden, for Mr. W. Lindsay. Mr. H. E. Pollard, architect :—

Jackson & Todd	£769 0 0
Howard & Co.	750 0 0
J. Vears & Co. (accepted)	729 0 0

LONDON.—For repairs, alterations, and additions at No. 30, St. Paul's-churchyard, E.C., for Mr. R. A. Bax :—

Smith	£785 0 0
F. Foxley & Co.	777 0 0
J. Vears & Co. (accepted)	730 0 0

LONDON.—For works to be done at St. Bartholomew's Church, Moor-lane, Cripplegate, City—distempering and cleaning interior nave and decorations to chancel. Mr. Randolph Payne, architect, 2, Noel-street, Colebrook-row, N. :—

J. Lidstone & Son	£107 0 0
J. Grover & Son	102 10 0
Oakley & Co.	95 0 0

LONDON.—For building additional buildings to St. Olave's Model Dwellings, Walnut Tree-walk, Lambeth, for Mr. A. Mackenzie. Messrs. Stock, Page, & Stock, architects, 9, Denham-street, London Bridge :—

J. Beale, Westminster Bridge-road...	£2,344 0 0

[No competition.]

LONDON.—For building new factory in rear of Nos. 181, 183, and 185, Upper Kennington-lane, for Messrs. Brine Brothers. Mr. John A. J. Woodward, architect, 10, Crown-buildings, Kennington Oval :—

Greenwood.....	£525 0 0
Tyerman	525 0 0
Smith	523 0 0
Hooper	511 0 0
J. Beale	503 0 0

PLAISTOW. — For the erection and completion of factory premises, chimney-shaft, &c., at Butchershedge-lane, Plaistow, West Ham, Essex, for Messrs. W. Goodacre & Sons. Mr. Thomas Fletcher, architect, 73, Bow-road, E. :— *Corrected List.*

A. Read	£9,676 0 0
Nightingale.....	8,943 0 0
Peto Bros.	8,698 0 0
Lascelles	8,500 0 0
Hearle & Son.....	8,370 0 0
J. Morter	8,143 0 0
Perry & Co.	8,073 0 0
J. R. Hunt.....	8,016 0 0
Cox	7,900 0 0
Higgs	7,900 0 0
Walker	7,870 0 0
Shurmur	7,677 0 0
Gentry	7,585 0 0
Norton & Son.....	7,367 0 0

PLUMSTEAD.—For the erection and completion of chapel, waiting-rooms, lodge, entrance gates, &c., for the Plumstead Burial Board. Mr. H. H. Church, architect. Quantities by Mr. W. H. Strudwick:—

Marriott	£5,923	0	0
Chapman	5,169	0	0
Holloway	4,879	0	0
Staines & Son	4,825	0	0
Battley	4,593	0	0
Longley & Co.	4,550	0	0
J. O. Richardson	4,239	0	0
Kemp	4,098	0	0
Proctor (accepted)	4,000	0	0
Martin	3,998	0	0

READING.—For rebuilding the "Swan," St. Mary's Butts, and adjoining premises, for Messrs. Hawkins. Mr. Geo. W. Webb, architect, 14, Friar-street, Reading:—

Kingerlee, Oxford	£2,597	0	0
Searle, Reading	2,333	0	0
Margetts, Reading	2,287	0	0
Collier & Catley, Reading	2,247	0	0
G. Lewis, Reading	2,230	0	0
Silver & Sons, Maidenhead	2,225	0	0
Higgs & Son, Reading	2,219	0	0
Bottrill & Son, Reading	2,175	0	0

READING.—For alterations to three houses in the King's-road, for Capt. Frederick Stephens. Mr. Geo. W. Webb, architect, 14, Friar-street, Reading:—

Searle, Reading (accepted)	£430	0	0

ST. ALBANS.—For new roads at Bedford Park, St. Albans, Herts. Mr. R. A. Hill, surveyor, St. Leonard's-on-Sea:—

Trickett (Millwall)	£895	0	0
Simpson (Bow)	800	0	0
Miskin	712	0	0
Haselgrove	639	0	0
Rutty (Bromley-by-Bow)	630	0	0
Dickson	607	0	0
Capper	477	10	5

WARGRAVE.—For additions, &c., to the "George and Dragon" Hotel, for Messrs. Hawkins. Mr. Geo. W. Webb, architect, 14, Friar-street, Reading:—

Cox, Maidenhead	£1,195	0	0
Goodchild, Reading	1,080	0	0
Kingerlee, Oxford	1,067	0	0
Clements, Henley-on-Thames	1,049	0	0
Weyman, Henley-on-Thames	1,020	0	0
Musselwhite, Basingstoke	998	0	0
Bottrill, Reading	987	0	0
Silver & Sons, Maidenhead	984	0	0
Simmonds & Son, Reading	975	0	0

G. Lewis, Reading (accepted).

WARGRAVE.—For new tea-room and additions to buildings, for Mr. Charles Crocker. Mr. Geo. W. Webb, architect, 14, Friar-street, Reading:—

J. Parritt, Wargrave (accepted)	£375	0	0

WATFORD.—For additions to the Watford Public Library. Mr. W. H. Syme, architect, Watford:—

Neal	£710	0	0
Dove	657	10	0
Clifford & Gough	645	0	0
Waterman	645	0	0
Turner, Limited	588	0	0
Andrews & Sons	582	0	0
Judge & Eames	510	0	0
Wiggs (accepted)	485	10	0

[All of Watford.]

WATFORD (Herts).—For alterations at No. 49, High-street, for Mr. S. H. Timms. Mr. C. P. Ayres, architect, Watford:—

Judge & Eames	£495	0	0
Andrews	396	0	0
Waterman	384	0	0
Clifford & Gough	337	0	0
T. Turner, Ltd. (accepted)	326	0	0

Industrial Dwellings, Bethnal Green.—In last week's issue of the *Builder* we published a list of tenders for Industrial Dwellings in Brady-street, Whitechapel, stating that the quantities were taken out by "F. J. Green & Pietersen." It should have been T. Thornton Green & Pietersen."

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office, 19s. per annum (or 4s. 9d. per quarter), can ensure receiving "The Builder" by *Friday Morning's post.*

TO CORRESPONDENTS.

E. H.—E. A. H.—A. B. (will write).—B. C. & Co. (next week).—J. W. M. & L. (too small).

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PUBLISHER'S NOTICES.

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PREPAYMENT IS ABSOLUTELY NECESSARY.

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DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C,

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY, and for the front Page by the same hour on WEDNESDAY.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY mornings.

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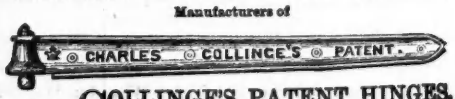

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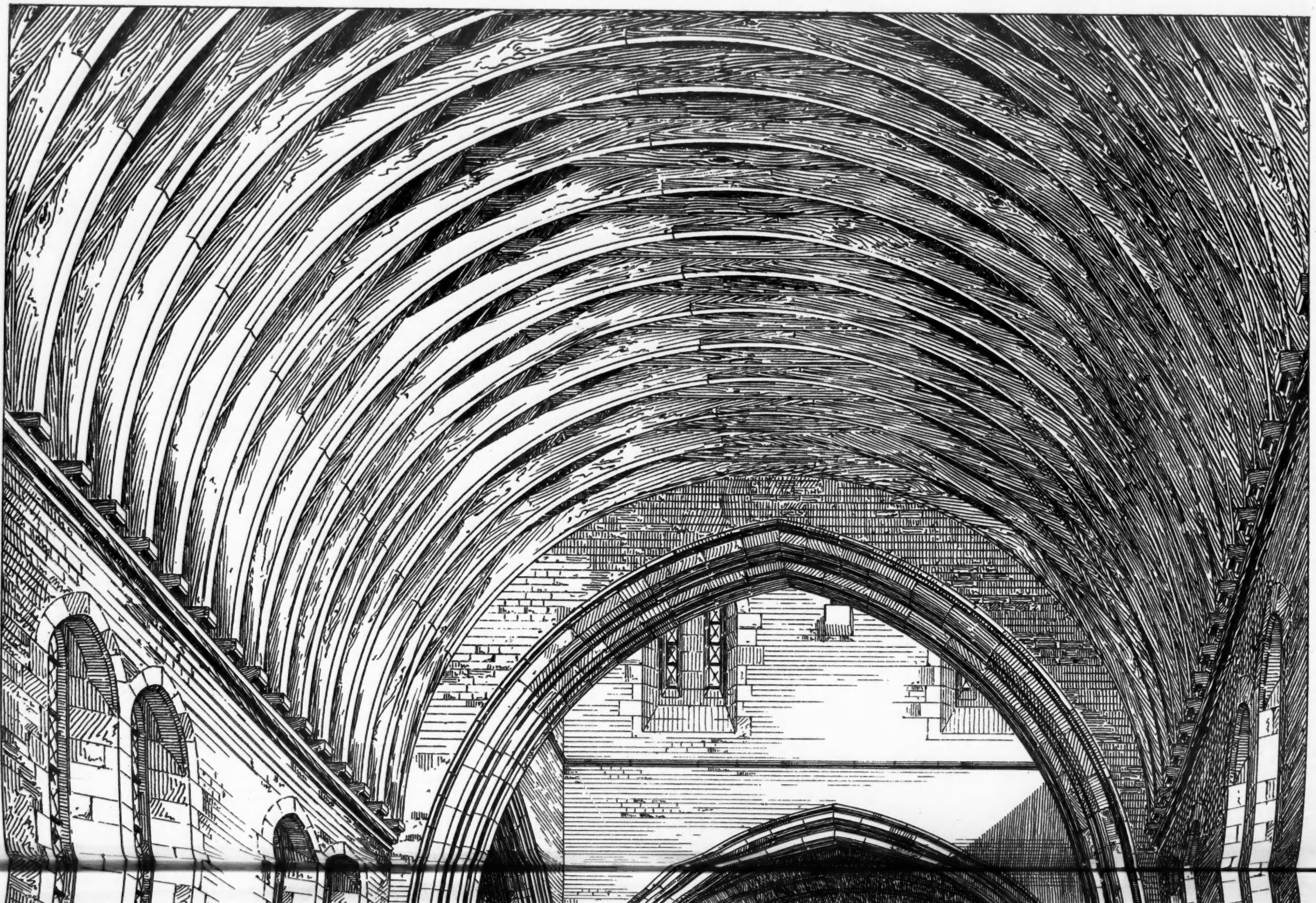

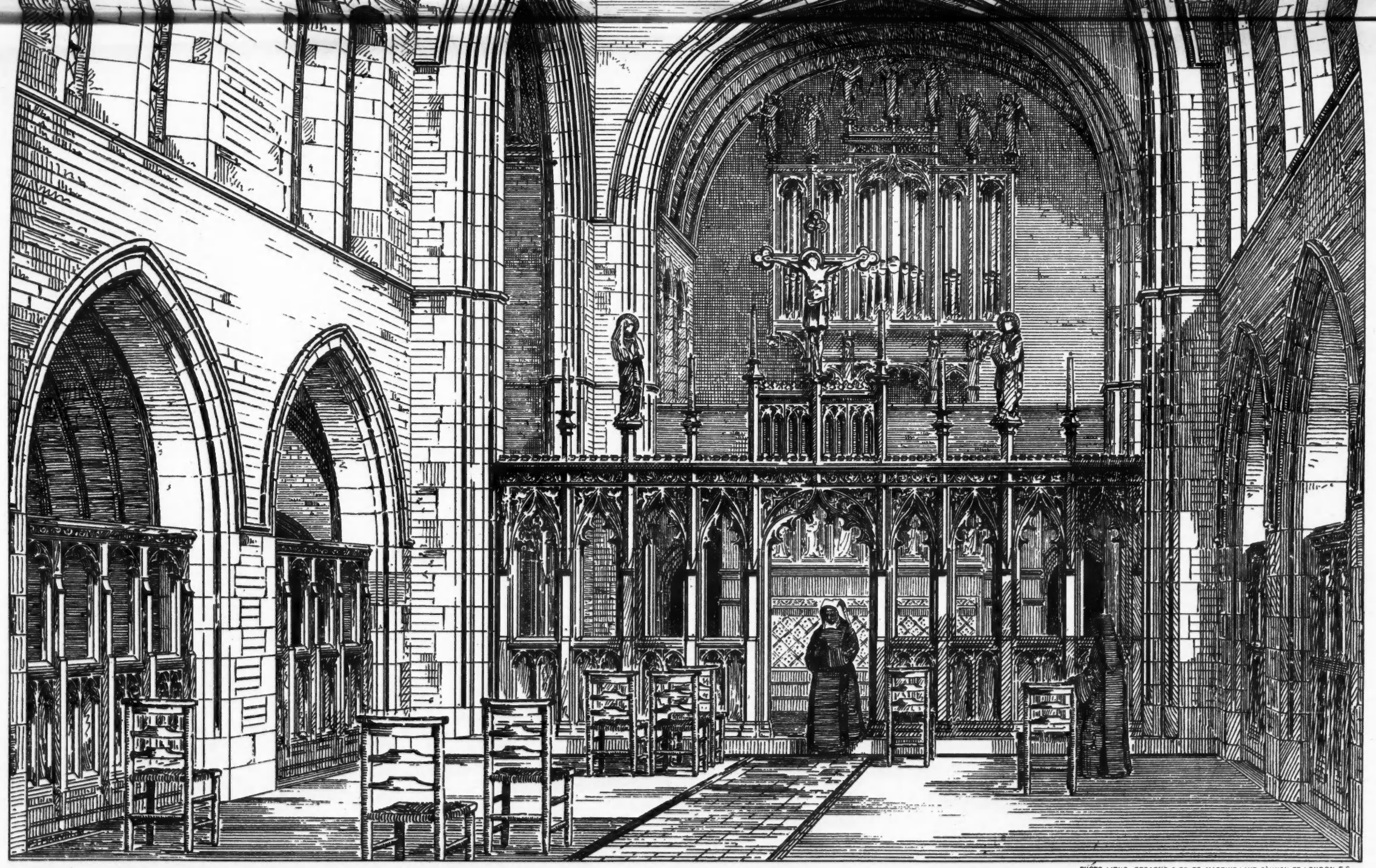

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ST. MARY'S ABBEY, MILL HILL.—Messrs. Goldie, Child & Goldie, Architects.

INTERIOR VIEW.

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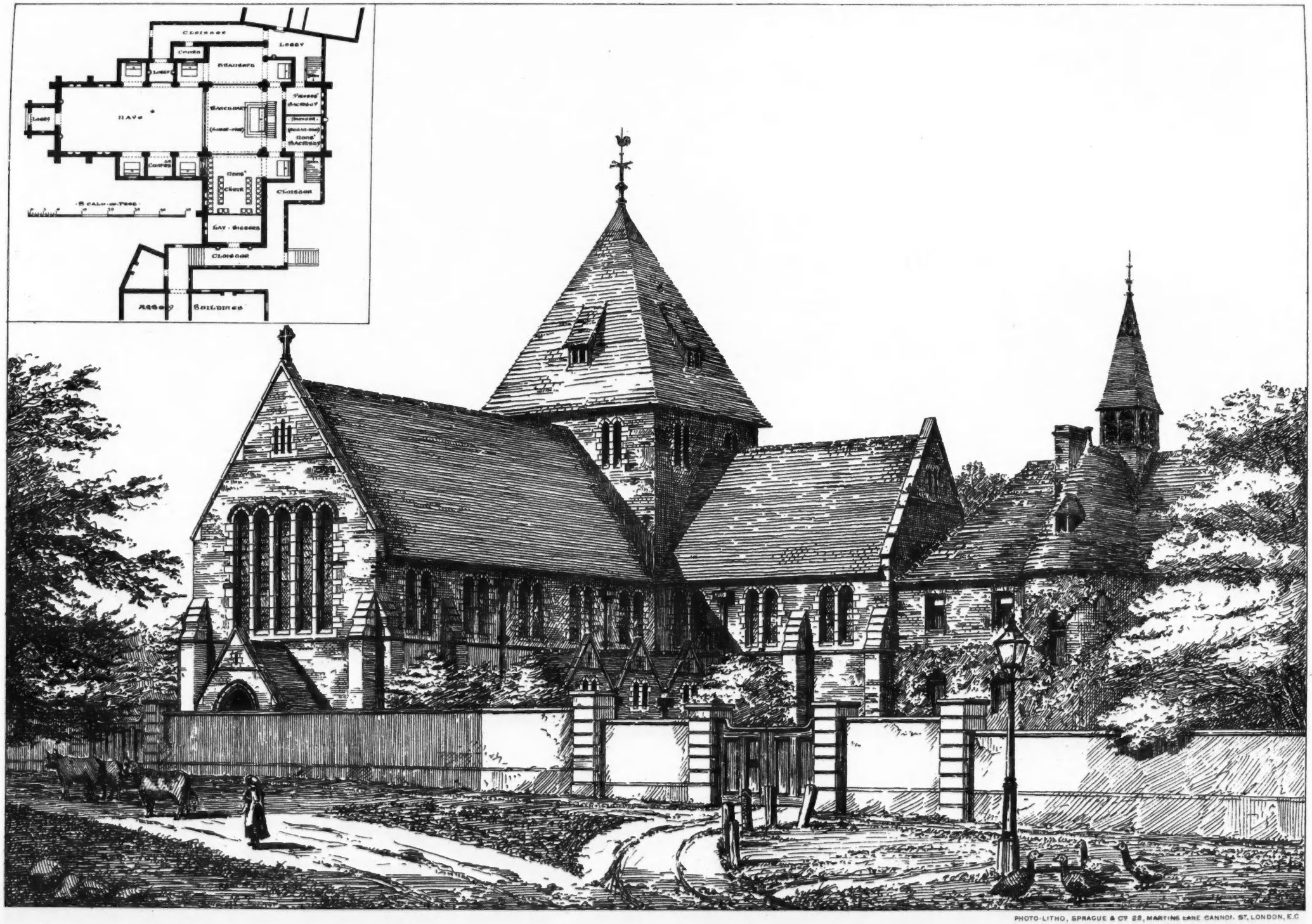
FRIARS' SCHOOL COMPETITION, BANGOR: DESIGN PLACED SECOND.—Messrs. Oliver & Leeson, Architects



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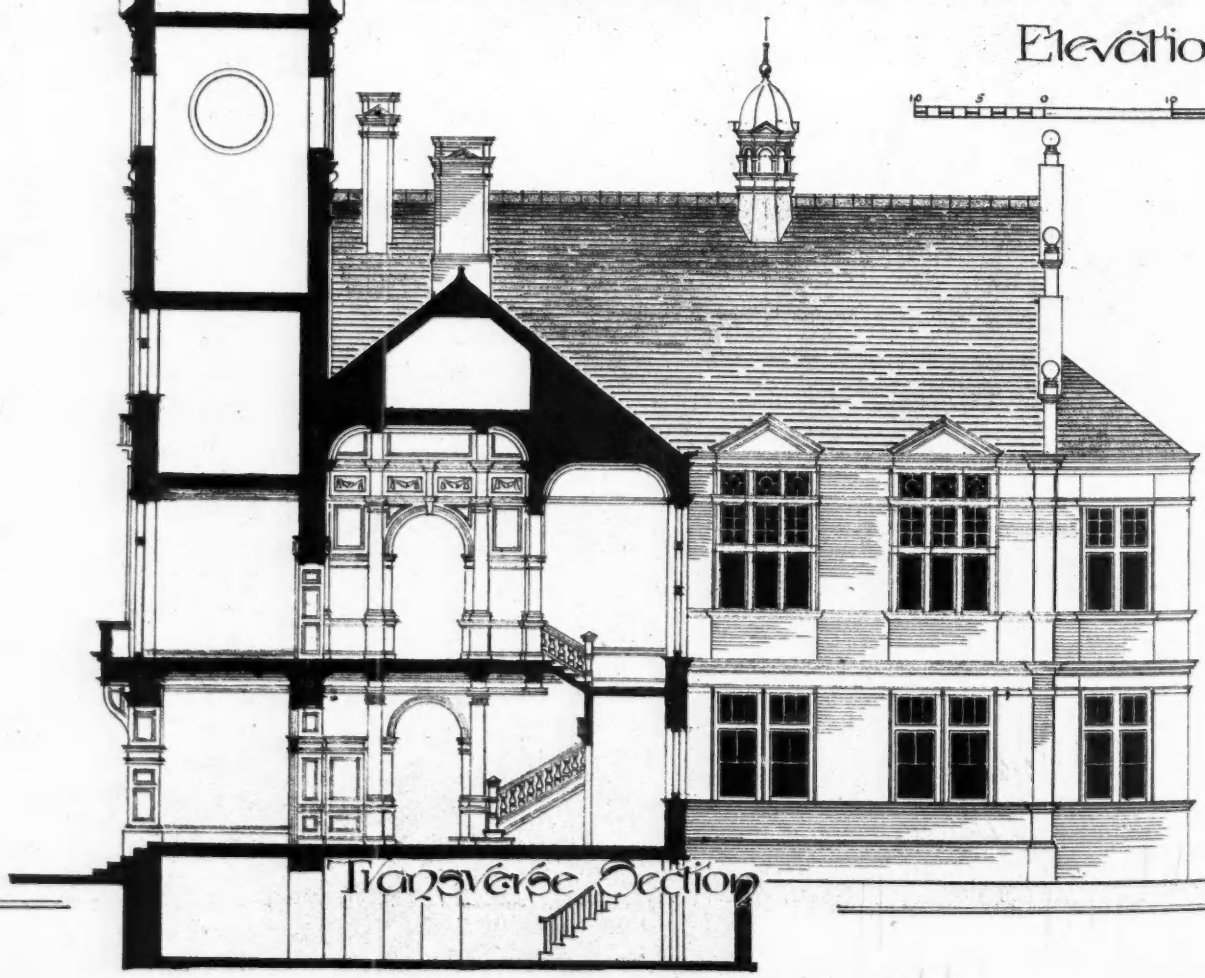
Elevation to Rollest

SCALE OF F



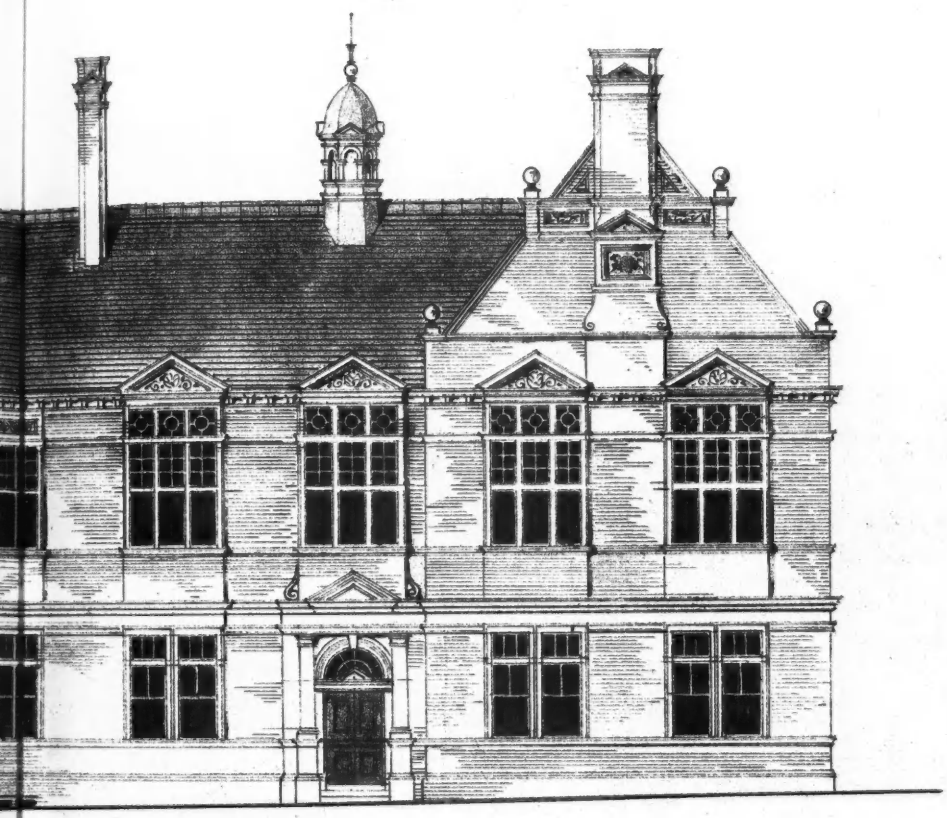
Transverse Section

SWINDON NEW TOWN

DESIGN FOR

Proposed Public Offices

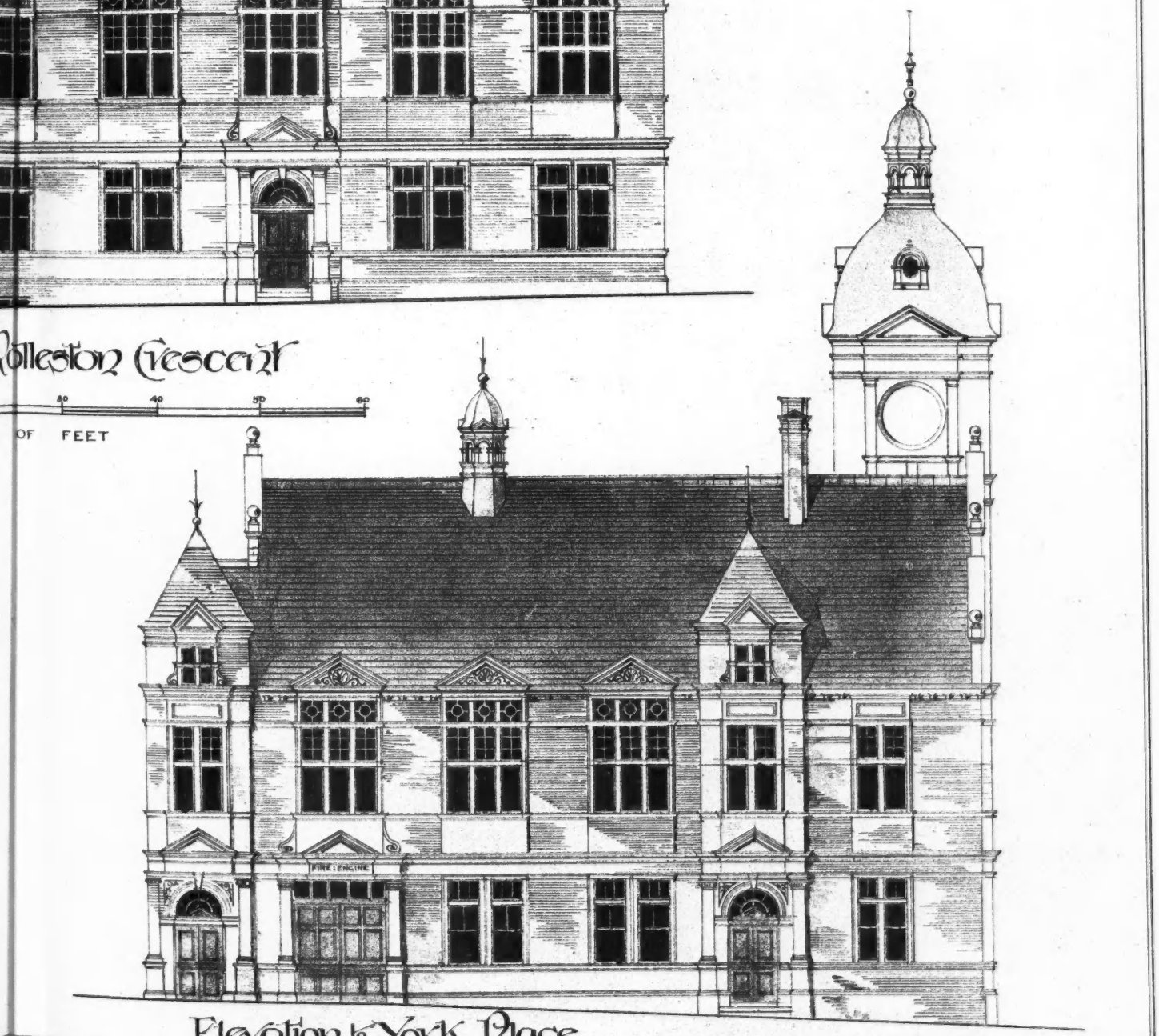
Mr Brightwen Binyon · R·R·I·B·A · Architect.



Rolleston Crescent

20 40 50 60

OF FEET



Elevation to York Place

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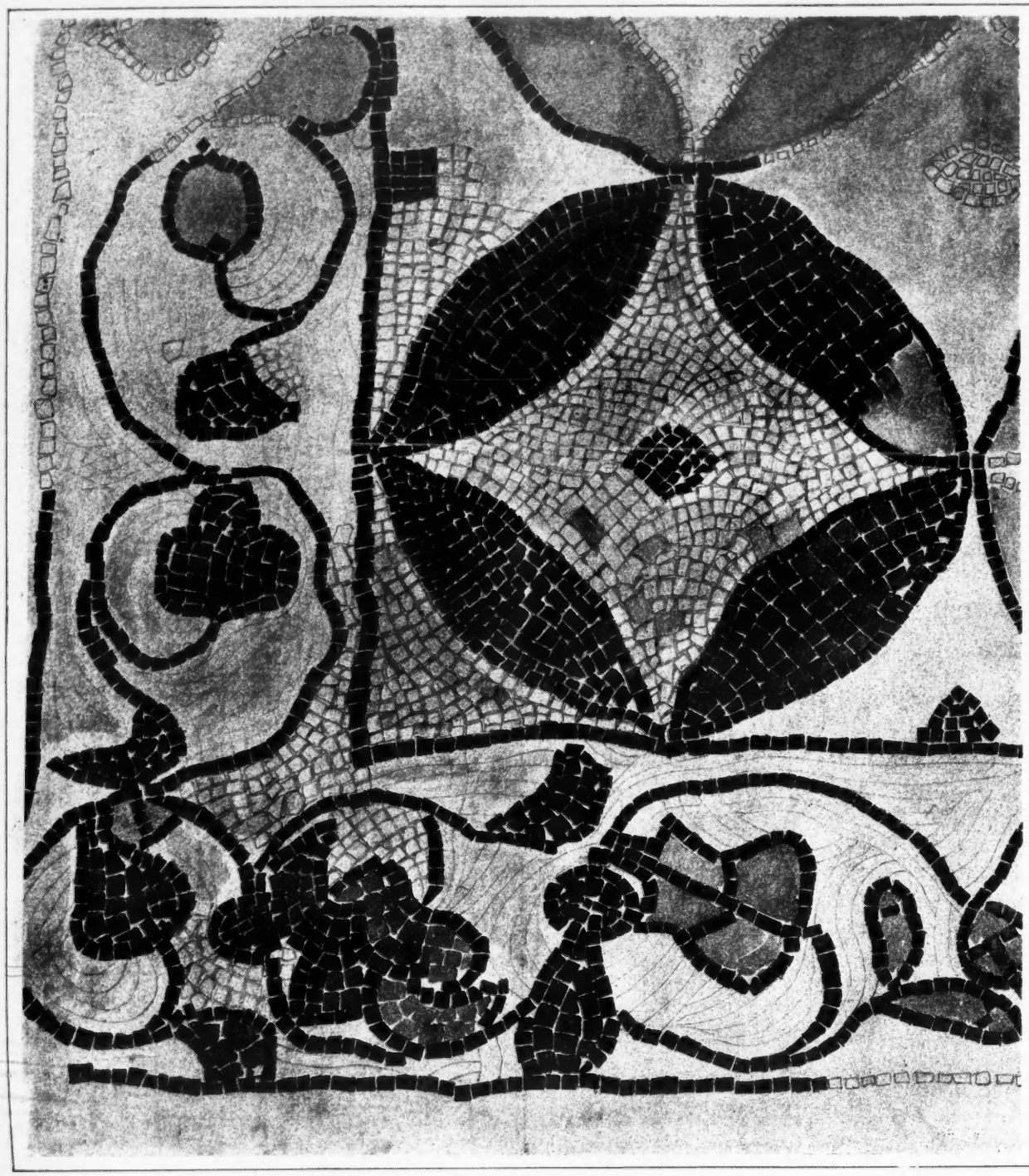

ANCIENT ROMAN MOSAIC PAVEMENT, SAN·ZENO, VERONA.

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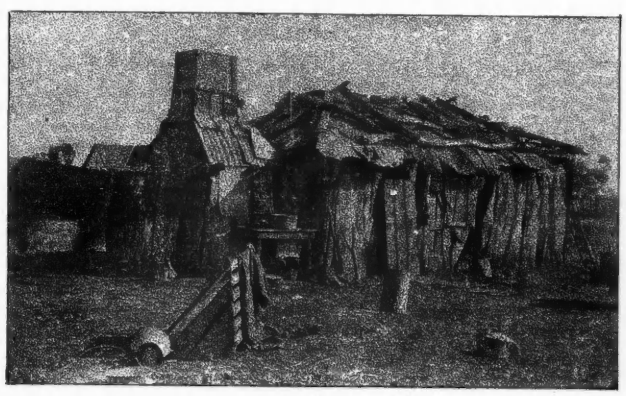
ANCIENT ROMAN MOSAIC PAVEMENT, IN THE MUSEUM, VERONA.

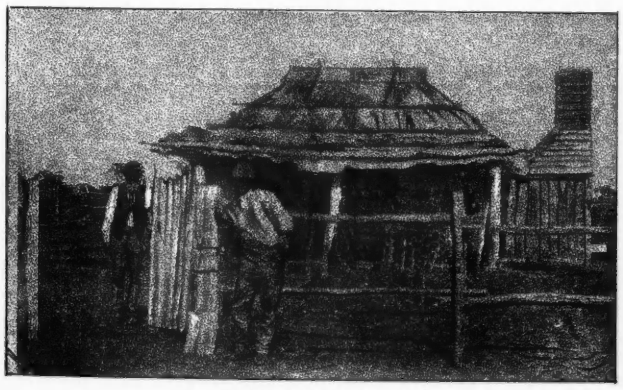
DRAWN BY Mr. GERALD HORSLEY.

1. FIRST ATTEMPT.

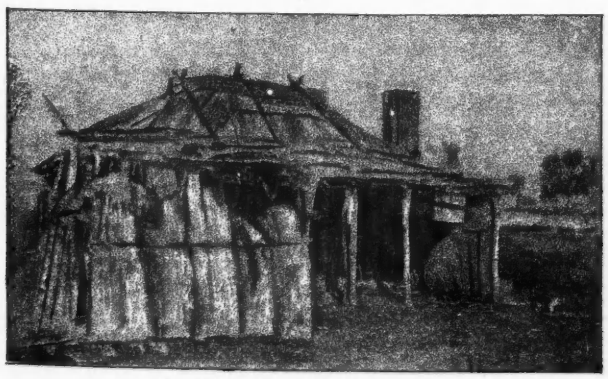
2. EXTENSIVE DEVELOPMENTS.



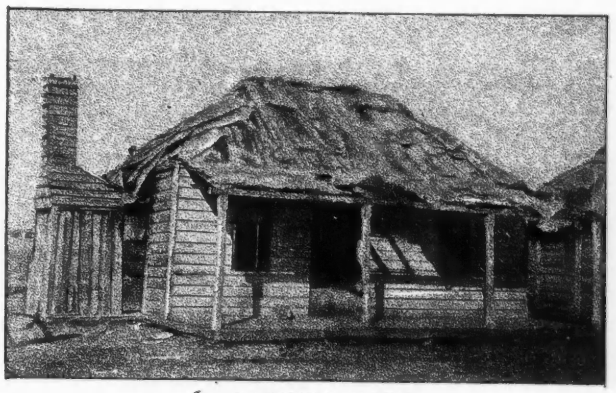
3. A SLAB "HUMPY."



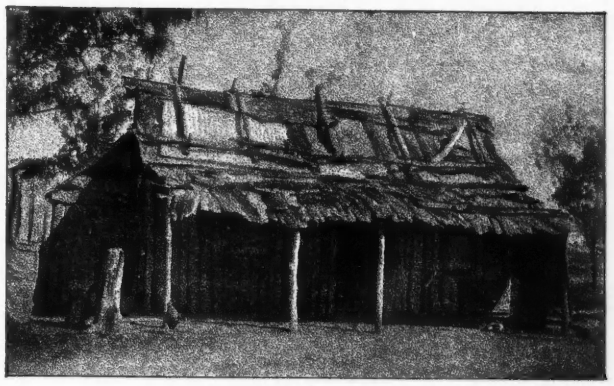
4. IMPROVED "HUMPY.".



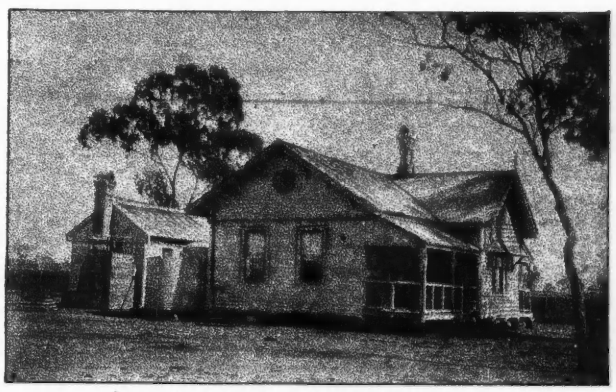
5. FURTHER IMPROVEMENTS.



6. A BOARDED HOUSE.

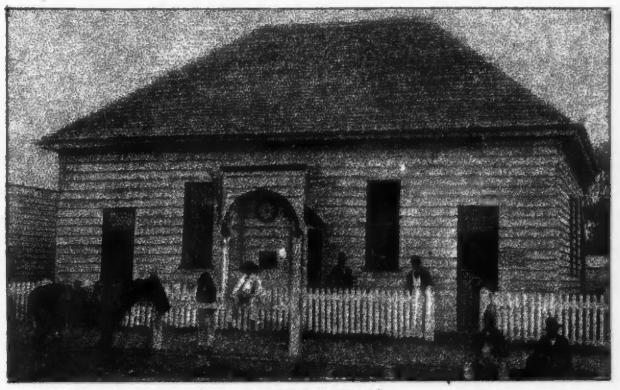


7. CHINAMENS' GARDENS.



8. RAILWAY OFFICIAL RESIDENCE.

9. A COURT HOUSE.



10. A TOWN HALL.

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